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Report No. 1

# Cultural Resources

## Testing Archaeological Inference at an Historical Logging Site in Montana

George Charles Knight

This report initiates the Cultural Resource Report series of the Northern Region, USDA Forest Service. The series will include reports which are a contribution to knowledge in history or archaeology, in which the work was done on National Forest land or under the auspices of the USDA Forest Service.

Good management is based on good information. Thus, our purpose in bringing forth these reports is to disseminate information which relates to and will aid in the management of cultural resources in the Northern Region.

This first report, "Testing Archaeological Inference at an Historical Logging Site," was originally submitted in May 1980 as a thesis in partial fulfillment of the M.A. at Texas Tech University by George C. Knight. This report is a slightly revised version of the thesis.

# TESTING ARCHAEOLOGICAL INFERENCE
# AT AN HISTORICAL LOGGING SITE
# IN MONTANA

by

George Charles Knight

CULTURAL RESOURCE REPORT NO. 1

USDA Forest Service
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## ACKNOWLEDGMENTS

Many people have contributed, both directly and in other ways, to the development of this paper. I would first like to thank the members of my thesis committee for their involvement in the project, and to acknowledge their much larger contributions to the development of my thinking: Dr. William J. Mayer-Oakes, Dr. Nancy P. Hickerson and Dr. James A. Goss, all of Texas Tech University, and Dr. James D. Keyser, currently Pacific Northwest Regional Archaeologist. Their helpful comments on and criticisms of other drafts of this paper have been a substantial addition.

Four people contributed generously and voluntarily of their time and effort in providing me with important assistance. Mark Miller struggled to help me produce the drawing in Figure 3. Alice Portnoy and Dr. Paul R. Katz graciously volunteered to edit earlier manuscripts, and Kathy Wright provided the kind of intangible yet essential spiritual support without which I think nobody's work would get done.

A special note of appreciation and gratitude goes to George D. Cameron, logging specialist for the Lewis and Clark National Forest, whose interest in and knowledge of the histories of his profession and of the Smith River country contributed both substantively and inspirationally to this study. Our conversations about the Sheep Creek logging activities spawned ideas that have become central to this thesis. George Cameron is one of the many people on the Lewis and Clark who has contributed to a pleasant working atmosphere, and who realizes that an archaeologist remains a scientist even in the bureaucratic setting.

While acknowledging the contributions of all of these people, I make the traditional and appropriate concession that this presentation, and its flaws, are totally my own.

CONTENTS

# ABSTRACT

Logging activities conducted near the turn of the present century on Sheep Creek, in central Montana, have left a wealth of material remains representative of timber harvest and log transportation technology of that era. Remains now identifiable on Sheep Creek include the by-products of timber harvest, and of the means by which logs were conveyed over land and water to sawmills.

Investigations of the entire Sheep Creek timber harvest and transportation system were made before it was known whether any written documentation of this particular historic land use existed. This situation posed a challenge to the archaeologist: Could archaeological methods be employed to derive valid propositions concerning the nature and use of the site? Historical documentation, if any could subsequently be found, would provide a precise means of testing hypotheses derived archaeologically.

This paper presents the results of a five-stage research process which included inventory of the Sheep Creek timber harvest and transportation system; the gathering of historical analogs to the site; derivation of inferences pertaining to the use of the site; a successful attempt to obtain written records for the site; and a comparison of archaeological inferences with historical fact.

Comparison of historical records and archaeological inferences yields a high degree of correlation. Interpretations made of the

materials on the Sheep Creek site are consistent with historical knowledge, and propositions made concerning the use of the site are verified historically. This successful case of archaeological inference is seen as having relevance to archaeologists working in the prehistoric context in central Montana.

LIST OF ILLUSTRATIONS

# CHAPTER I

## AN INTRODUCTION TO THE STUDY

The large historical site discussed in this paper is a timber harvest and transportation system (and the physical remains by which it is now evidenced) which is located in Montana, on a small mountain stream named Sheep Creek. Designated as site 24ME92 under the Smithsonian trinomial system, the presently-identifiable remains of historic logging activities on Sheep Creek are, in part, located on lands now administered by the Lewis and Clark National Forest. In 1976, the existence of the site was first noted as part of the Lewis and Clark National Forest's cultural resource management program. Because the site was (and remains) not threatened by any federal undertaking, and because the work load of the seasonal archaeologist was heavy that summer, a document amounting to a "site lead" was added to the Forest's cultural resource files, and a recommendation was made that a complete investigation take place when time and personnel would permit it (Loscheider 1976).

I was given that opportunity during the autumn of 1979 while employed as the Lewis and Clark's cultural resource technician. To begin the investigation, I first contacted George D. Cameron, the logging specialist on the Forest's White Sulpher Springs Ranger District. He had been named as a key informant in the site lead originally filed by Loscheider (1976). George Cameron showed me the locations of three splash dams (Glossary), to which the site lead had referred, and

also of two log chutes and several log decks (Glossary) which he felt might be associated.

On my initial visit to the site where I observed the dams, chutes, and log decks, I was impressed with the feeling that they represented a logging operation of some magnitude and complexity. Based on what little knowledge I then had of logging technology, and on what I learned in conversations with Cameron, I speculated that the different features I had seen may have been used sequentially, perhaps on a seasonal basis (this line of thinking is developed later in the paper). The historical site on Sheep Creek thus posed a challenge: Could the methods of archaeological observation and inference be employed to arrive at valid propositions concerning the nature and use of site 24ME92? Although I knew at the time of no historical records pertaining to the site, I felt that, if any could be found, they would provide a precise means of testing archaeologically-derived inferences.

This paper presents a test of archaeological inference, conceived during my initial viewing of site 24ME92. It culminates a five-stage research process which I devised, consisting of (1) an archaeological inventory of site 24ME92; (2) a primary library research phase in which historical analogies to the site were sought; (3) the derivation of inferences from information gained in the above two stages; (4) a secondary library research phase in which historical records pertaining directly to 24ME92 were sought; and (5) the preparation of this report.

Archaeological fieldwork, the first stage of research, was conducted on eleven different days during the period of September 10 to October 15, 1979. During this first stage of research, the site's features were described, measured, photographed, and plotted on USGS 7.5-minute quadrangles. These records now reside at the Lewis and Clark National Forest Supervisor's Office. The site description given in Chapter II of this paper resulted directly from inventory of 24ME92.

The inventory of 24ME92 was based entirely upon observation of surface or naturally exposed subsurface remains. Nothing was dismantled during the investigation, and no earth was moved. This strategy posed certain limitations upon the kinds of "evidence" obtained, especially with regard to measurements and photographs of the remains. These limitations are made explicit in the site description which follows. Although precision was sacrificed at times in favor of a non-disturbing inventory, I made certain (as I will attempt to show) that the observations made are in all cases sufficient for the tests of hypotheses about the use of the site as discussed in Chapter IV.

Primary phase library research constituted the second research stage. This involved examination of historical literature pertaining to logging operations conducted in areas of Montana other than Sheep Creek and elsewhere in the United States, an effort which I hoped would provide me with insight concerning the sorts of human behavior which could result in the deposition of material remains like those observed at Sheep Creek. Although I utilized historical documents in this research stage, I consider

it to have been an "archaeological" step because I stayed away from Sheep Creek itself. The discussion of historical logging and transportation devices given in Chapter III resulted directly from primary phase library research.

In the third research stage, inferences about the use of site 24ME92 were made based on my archaeological observations there and on knowledge of human behavior which was gained from accounts of historical logging activities. As stated above (p. 2), I had speculated during my initial visit to the site that activities there had been sequenced in some way. This research stage produced the explicit propositions about activity sequencing and scheduling which are detailed in Chapter IV. One of the days spent on the site in early October was devoted to questions raised about 24ME92 by this research exercise.

The fourth research stage involved secondary phase library research. A navigability study of the Smith River by Newell and Williams (1974), in whose catchment Sheep Creek lies, contains references to historical logging activities on Sheep Creek, and has served as a basis for further efforts to document site 24ME92 historically. On November 1, I presented a preliminary report of archaeological and historical data at the Thirty-seventh Plains Conference (Knight 1979). At the Montana Historical Society Library, I gathered additional newspaper and archival references to 24ME92, to supplement those found in the fine report by Newell and Williams (1974). The results of secondary phase library research are presented in Chapter V.

Finally, notes taken in the field and in the library have been expanded to comprise Chapters II through V, and portions of the preliminary report

presented at the Plains Conference (Knight 1979) appear in Chapters II and V. The final chapter (Chapter VI) of this paper and the Glossary were prepared entirely during this fifth and final stage of research.

# CHAPTER II

# THE SITE, ITS SETTING, AND ITS FEATURES

## The Sheep Creek Timber Harvest and Transportation System--Site 24ME92

Included in the inventory of site 24ME92 are three splash dams, two log chutes, a hauling road, seven log decks, and stands from which timber was harvested. These features are described at length below; for definitions of the terms, consult the Glossary. Collectively, the features listed comprise the entity which has been, and will hereafter be, referred to as the Sheep Creek timber harvest and transportation system. Although not the sort of localized, spatially continuous site commonly studied by Montana archaeologists (the remains are scattered along a 14-mile segment of Sheep Creek), I will show that it represents a single resource procurement system, and therefore warrants consideration as a unit.

Proceeding upstream along Sheep Creek (generally west to east) the component features of 24ME92 occur as follows (Figure 2): (1) located 17.7 miles above the point where Sheep Creek enters the Smith River is the lowermost of the three splash dams; (2) situated 7.7 miles above this dam is a second splash dam; (3) within a two-square-mile area of mountainous land immediately south of this dam are the log chutes, the hauling road, the log decks, and the areas from which timber was harvested; and (4) located 6.2 miles above the

second splash dam is the third dam, from which the head of Sheep Creek is 4.2 miles upstream.

In following sections, the features which comprise the Sheep Creek timber harvest and transportation system are described. Some historical references are used in these sections to introduce terms and concepts; however, for the most part the discussions are of the items of material culture observed to be present at 24ME92.

## Sheep Creek and the Little Belt Mountains

Sheep Creek is located in the upper Missouri River basin in Meagher County, central Montana (Figure 1). A moderately-sized stream with a drainage area of 196.3 square miles (U. S. Geological Survey 1974:129), it rises high in the Little Belt Mountains, flows south for a few miles, then turns west toward the Smith River, which it joins after covering a total distance of about 36 miles. In its course, Sheep Creek falls 2,800 feet. From the mouth of Sheep Creek, the Smith River continues north and slightly westward for 80 miles to its confluence with the Missouri River near Ulm, Montana.

Sheep Creek's catchment lies entirely within the Little Belts, a part of the Northern Rocky Mountain physiographic province. Fenneman (1931:217) remarks that in central Montana, "the Rocky Mountain front makes a wide detour to the east

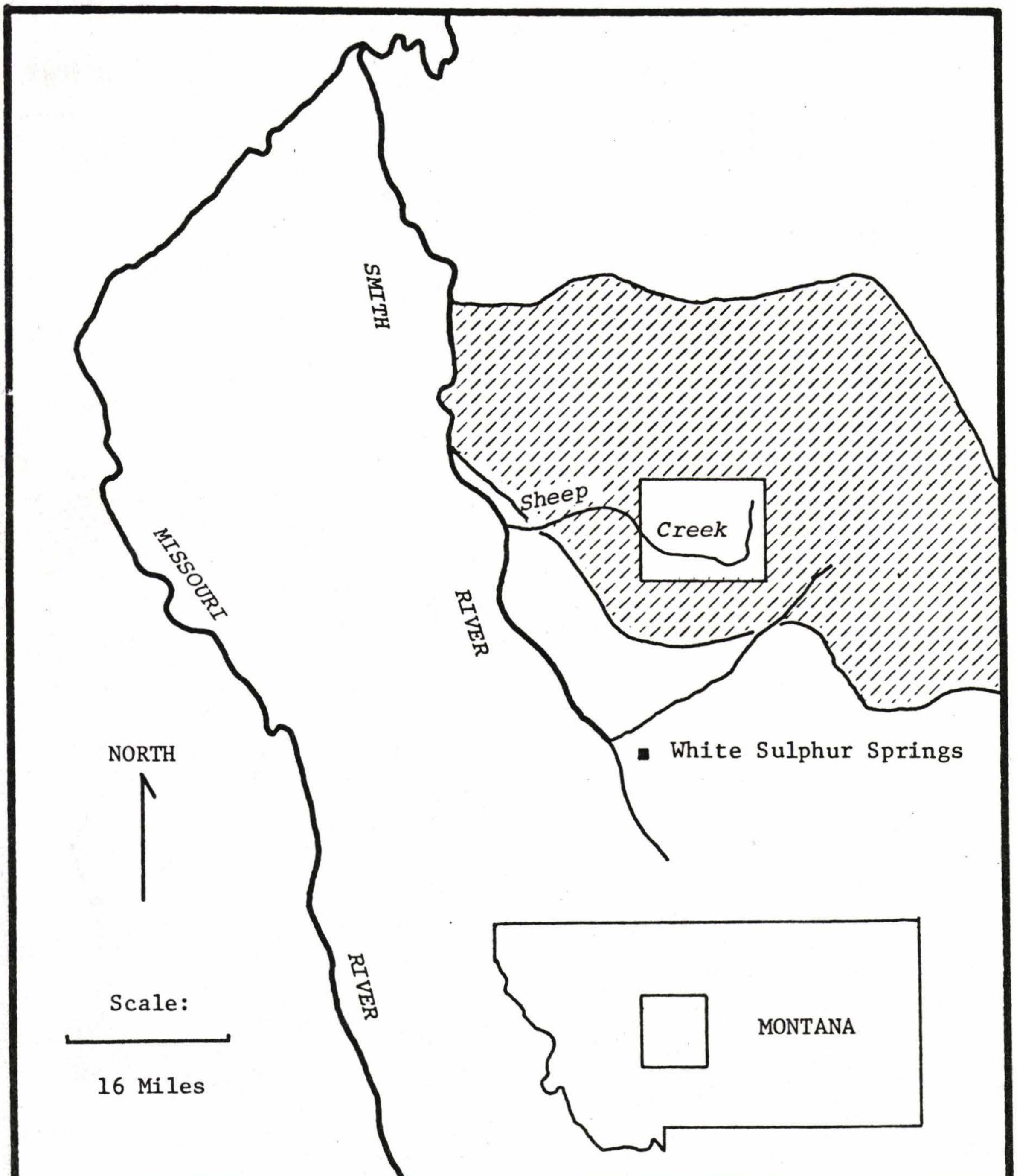

SMITH
RIVER
Sheep
Creek
MISSOURI
RIVER
NORTH
White Sulphur Springs
Scale:
16 Miles
MONTANA

Figure 1: Sheep Creek and Vicinity. This map shows the relative locations of Sheep Creek, the Smith River, and the Missouri River. The shaded portion represents the extent of the Little Belt Mountains. White Sulphur Springs, located near the confluences of the forks of the Smith, is the seat of Meagher County. As indicated, the area to the north of the Little Belts, but also to their south and east, are open Plains country. The inset portion is shown in greater detail in Figure 2.

to surround the [Big] Belt and Little Belt ranges." Typified geologically as an anticlinal uplift with a batholithic core (Thornbury 1965:394), the Little Belt Mountains are "commonly spoken of as a range, but are more correctly designated as an elevated and eroded plateau region" (Weed 1900:273). The streams which drain the Little Belts "flow in deeply trenched courses, open and wide in the softer shaly rocks, [with] narrow canyons in the harder limestone strata" (Weed 1900:274).

In stark contrast to the dry, treeless Great Plains country which adjoins the Little Belt Mountains to the north, south, and east (Figure 1), the mountains themselves support vast stands of coniferous timber. That the Little Belts nevertheless experience a relatively dry climate, however, has been important in preserving the primarily wooden remains which comprise 24ME92. United States Department of Commerce (1978b:6) climatological data show that the Sheep Creek vicinity averages just over 20 inches of precipitation per year, often getting less. The bulk of yearly moisture (up to 60%) comes as rainfall during the months of May, June, and July, when evaporation rates are also at their highest (U. S. Department of Commerce 1978a:13). This combination of factors produces an effect which has contributed to the preservation of wooden remains which, in wetter climes, might already have vanished.

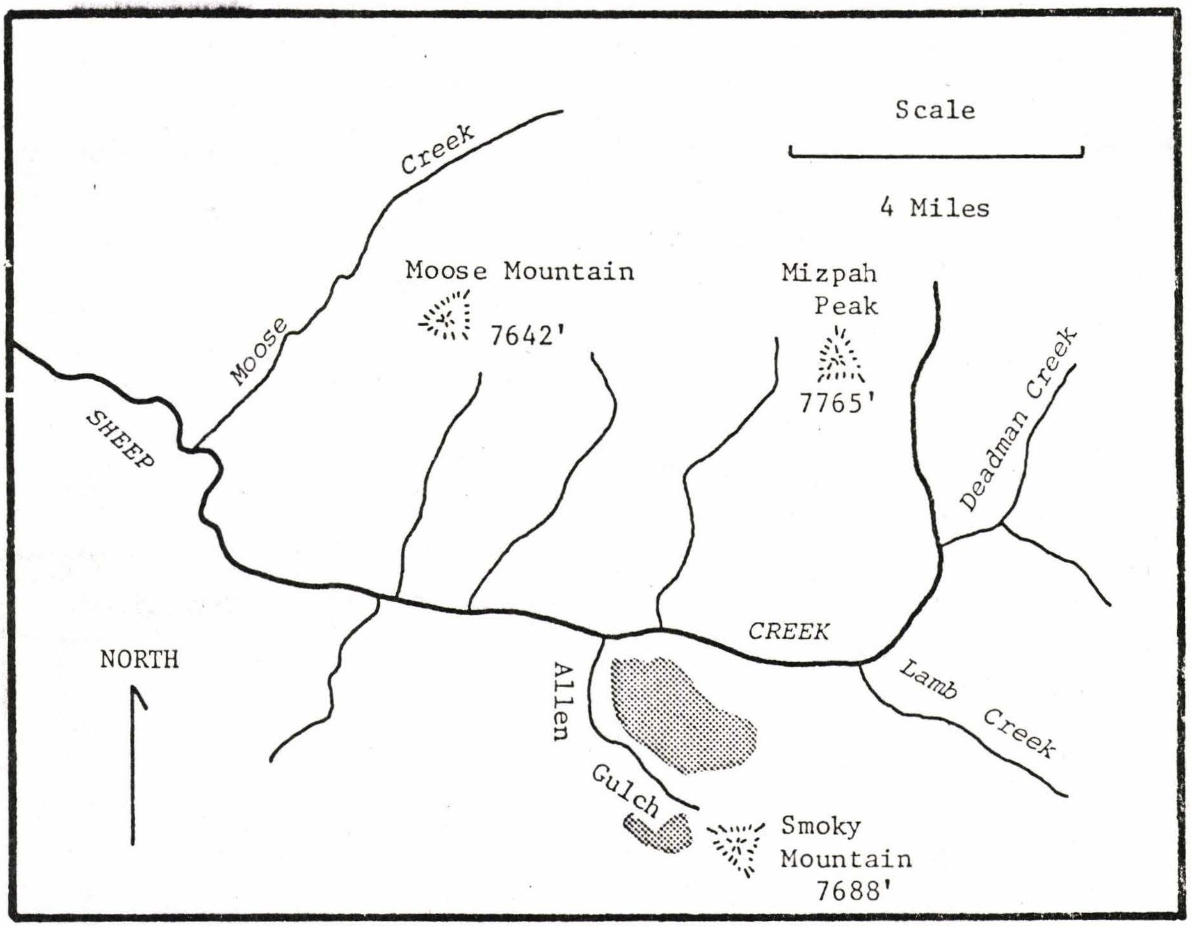



Figure 2: Sheep Creek, Its Important Tributaries, and the Area of Site 24ME92. Splash dams are located on Sheep Creek just below the mouths of Moose Creek, Allen Gulch, and Deadman Creek. The other components are located in the shaded area south of Sheep Creek.

## The Splash Dams

Before the first few decades of the present century, timber harvest and transportation were accomplished with a great deal of help from horses and from sheer human musclepower (Margolin 1911; Schon 1971). However, wood possesses a property which greatly facilitated its conveyance from place to place: it floats on water. Combined with the force of gravity, wood's buoyancy allowed it to be moved downstream quite economically. On a stream of sufficient volume, large quantities of logs could be floated over considerable distances in a process known as <u>log driving</u>. Under ideal conditions, a timber stand (Glossary) contiguous to a moving body of water could be cut, the logs rolled into the river, and then driven to market with minimum expenditure of the energy of men or draft animals (Roberge 1973).

To drive logs in any quantity large enough to be worth the effort required a stream both wide and deep; unfortunately, not all stands of merchantable timber are (or were) situated next to large rivers. Enterprising lumbermen, eager for profit and not to be daunted by the deficiencies of nature, shortly developed a technique which allowed them to drive logs down some amazingly tiny creeks. The technique involved the construction of dams, which impounded reservoirs in which logs could be floated. When enough logs had been moved into the pool, it was released, sending a torrent of logs and water rushing

through the dam and toward their destination. The procedure of either opening the dams, or dynamiting them, to effect a sudden flood probably helped them to earn the name, splash dams.

The three splash dams on Sheep Creek vary considerably in size and in the degrees to which they are preserved, but it is possible to determine by observation and comparison that their designs are similar (this point is elaborated below, in the section on "Dam Construction"). Each dam was built of apparently locally obtained and locally prepared logs and rough lumber, and in the construction of each, a minimum of metal hardware was used. Observation of the remains indicates that, rather than being the type designed for a single use, in which the dam was simply dynamited, the Sheep Creek dams were designed to allow repeated use. The construction of each includes a pair of lift gates, which could be opened, providing sluices through which water and logs could be allowed to pass without damage to the structure. Finally, each dam was placed closely downstream of the junction of Sheep Creek and a tributary (Figure 2). From west to east, these are Moose Creek, Allen Gulch, and Deadman Creek, respectively. Before turning to a consideration of their common attributes of design, I will briefly discuss the individual characteristics of the three dams.

## Moose Dam

The lowermost of the three dams is on Sheep Creek just downstream of its confluence with Moose Creek, at an elevation of approximately 5480 feet above mean sea level. Because it occupies Sheep Creek's flood plain (Holdorf 1975:6), over half of its 490-foot length (the horizontal dimension lying perpendicular to the stream's direction) is buried under fill and silt. Exposed portions of Moose Dam, though not sufficient to allow height and width (the horizontal dimension parallel to the stream's course) to be determined, are sufficient to allow important design features to be observed. These are discussed in the sections entitled "Dam Construction" and "Sluiceways and Lift Gates."

## Allen Dam

Located 7.7 miles upstream of Moose Dam, the second of the three splash dams is on Sheep Creek just below the point where it is joined by Allen Gulch. Its elevation is approximately 5880 feet. By far the largest of the three dams, Allen Dam is 650 feet long. It is also the best preserved, and exhibits the best exposure of the dam remains. Over two-thirds of its length either was never buried or has been buried and re-exposed, a fact which allowed detailed observations of its design to be made.

Deadman Dam

Located on Sheep Creek just below the mouth of Deadman Creek, the uppermost of the three dams is 6.2 miles upstream of Allen Dam, and lies at an elevation of 6240 feet. It is a small structure, its length not exceeding 150 feet. Proportionately more of this dam is exposed than of the others; unfortunately, Deadman Dam has been disturbed, in fact nearly destroyed, by modern highway construction and primarily by an unknown person who used a chainsaw on it for an unknown purpose. Despite the disruptions, the sluices and gates at Deadman Dam remain sufficiently well-articulated to enable their construction to be observed.

Dam Construction

Based on observations and measurements made at the exposed portions of all three dams, a general description of their designs and construction may be offered. It is assumed that unobservable--buried or disturbed--portions of Moose Dam and Deadman Dam can be understood using the more completely exposed remains at Allen Dam as a model.

Probably due to siltation, the footings of Allen Dam and Moose Dam, and of Deadman Dam as well, are beneath the present level of Sheep Creek's bed. Pieces of the structures at Allen Dam and Moose Dam appear in the stream and descend beneath the streambed, making a determination of the method used to anchor the structures impossible without excavation.

Above-ground remains at Allen Dam show that logs were cribbed, one tier upon another, to form four bulkheads parallelling the long axis of the dam and partitioned by cross-timbers spaced about every nine feet (Figure 3; Figure 4a). The presences of cross-timbers spaced at this interval, and of four bulkheads, are also observable at Moose Dam. Bulkheads apparently extended the length of each dam, except that gaps were left to accommodate sluices and lift gates, a fact which can be observed at both Moose Dam and Deadman Dam. Cross-timbers at all three dams were smoothed and notched so that each successive course fit snugly against the one below it, and reinforcement was provided by large wooden pegs which bound each cross-timber to the one below it (Figure 4b). All pegs were fashioned from available raw material using axes or perhaps adzes, and were driven into holes augered into the logs being bound. Many of the pegs observed are as long as two feet.

The net effect of this design was to form a triple row of "cribs" (Figure 3), each defined by the bulkheads and partitioning cross-timbers, a structural feature which allowed the builders to

Figure 3: An Idealized Plan of Dam Design. This figure, abstracted from sketches and photographs made at Allen Dam, shows the triple row of cribs (1) formed by bulkheads (2) and partitioning cross-timbers (3). Some of the cribs at each dam were filled with rock and earth ballast. The direction of the stream's flow in this figure would be from right to left. Note that the upstream (right-hand) bulkead is sloped so that the base is further upstream than the top of the dam. This drawing is not to scale.

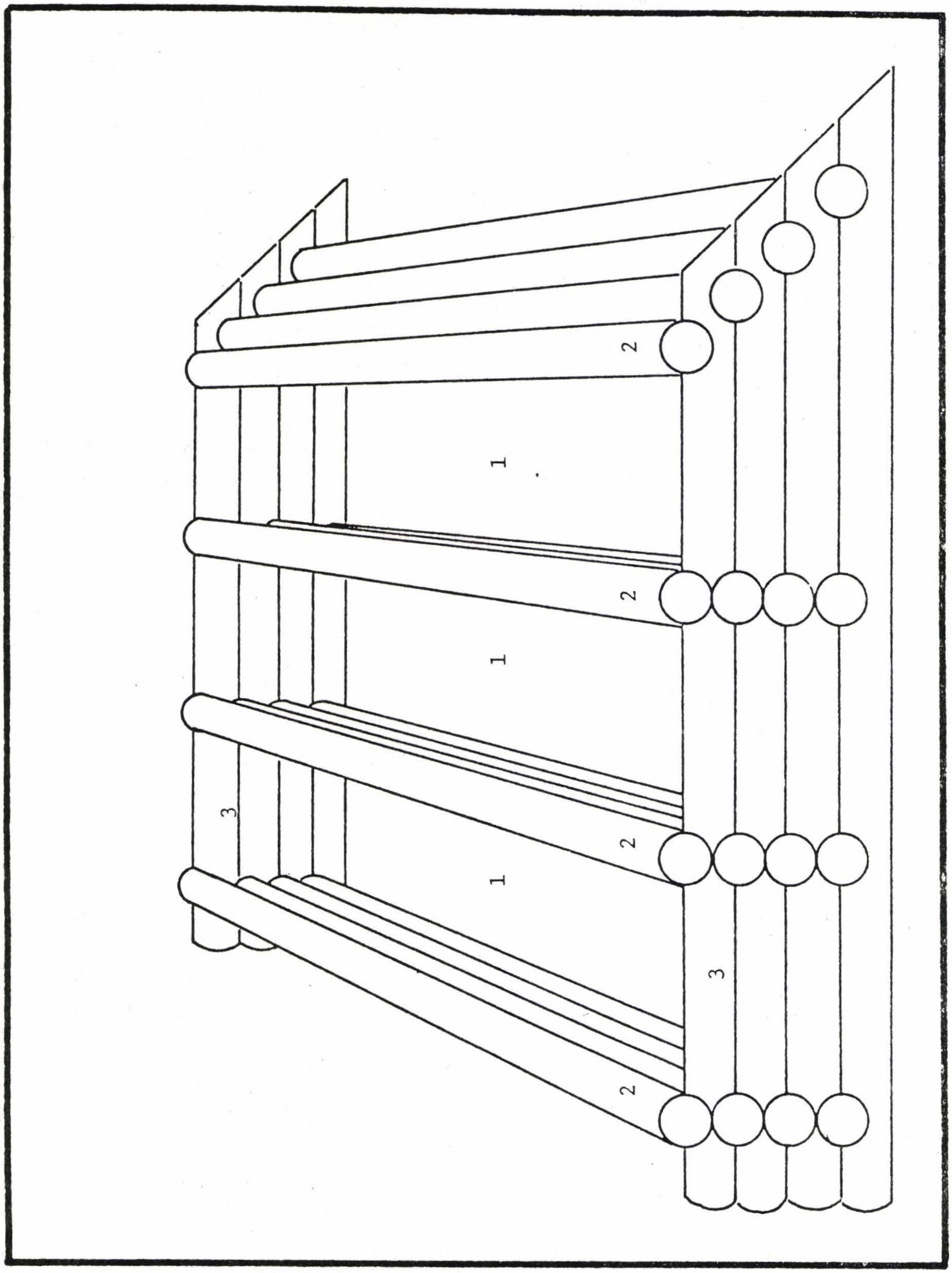

1
2
3

Figure 4a: View Looking North at a Portion of Allen Dam. As in Figure 3, the stream's direction of flow is from right to left in this photograph. The logs lying across the photographer's line of sight are cross-timbers. The top course of one of the bulkheads may be seen at bottom center. The earth at the right of the dam has been banked against the sloped inner bulkhead (cf. Figure 3). The top of the dam is tilted because the inner (right-hand) face of the dam has settled into the boggy soil there.

Figure 4b: A Wooden Peg Used to Bind Two Cross-Timbers. The peg shown in this photograph is about sixteen inches long. The logs which extend across the photograph are cross-timbers. At the extreme left hand side of the photograph, the ends of two bulkhead logs may be seen.

Figure 4a

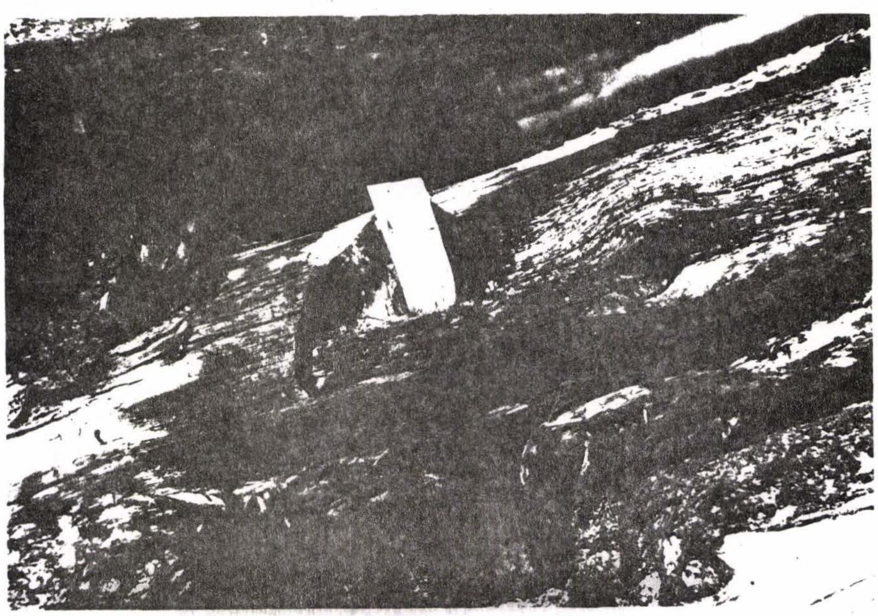


Figure 4b

further stabilize portions of the dams by filling some of the cribs with earth and rock ballast. At Moose Dam, three sets of cribs in the exposed portion are filled with earth and boulders; at Allen Dam and Deadman Dam, cribs adjacent to sluices remain filled. Had this measure not been taken, it is possible that the dams would not have been able to hold the enormous weight of the water contained in their reservoirs.

In this respect, an additional structural feature, observed at Allen Dam, was apparently considered necessary. By virtue of the fact that cross-timbers are progressively longer from the top to the base of the dam, it has a rhomboid cross-section (Figure 3). Whereas the downstream (outer) ends of cross-timbers, and the outer bulkhead, were set plumb (vertically), the upstream ends of cross-timbers were staggered and the upstream bulkhead was slanted. As a result, the inner (upstream) face of the dam is sloped so that the structure is widest at its base, where the greatest crushing force of the water's weight would have been exerted once the reservoir was filled. Had the inner surface of the dam been made perpendicular to the ground, the dam may simply have buckled.

That the inner face of the dam was sloped in this manner was also useful in enabling the builders to make it watertight. Against this slanted surface were lain adzed planks, providing a smooth, tight skin, which in turn was banked with earth (Figure 5a). This feature was observed at Allen Dam, where it was possible to differ-

Figure 5a: Detail of Construction at Allen Dam. This photograph is a closeup of the bevelled upstream end of a cross-timber at Allen Dam. Also visible just to the right of the center of the photograph are some of the planks which were apparently lain against the upper face of the dam to aid in making it watertight. The direction of the stream's flow in this photograph is again right to left.

Figure 5b: Sluiceway Siding at Moose Dam. This photograph is a view looking east (upstream) at the ends of planks which sided the partially-collapsed sluice at Moose Dam. A double thickness of planks is present. The thicknesses of the planks in the photograph are fairly uniformly about 4 inches. Although the planks have split, it is possible to measure their widths as originally being about 8 inches.

Figure 5a

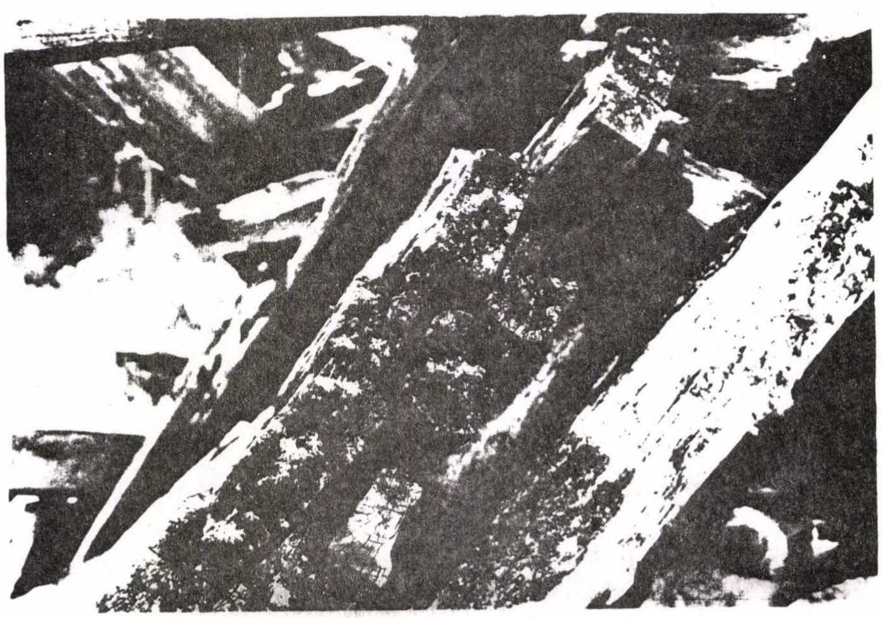


Figure 5b

entiate the coarse, gravelly earth which is piled against the dam from the fine silt which fills the floodplain above the dam. Located immediately south of both Allen Dam and Moose Dam are borrow pits from which soil, gravel, and larger rocks have been removed, possibly for the purposes of filling the dams and banking their upper faces.

## Sluiceways and Lift Gates

The finishing touches on each of the three splash dams were the sluices and lift gates. Rather than being the type of overflow floodgates commonly seen at the tops of modern concrete and steel dams, the sluices in the Sheep Creek splash dams were actual apertures in the dams themselves, apparently designed to allow complete drainage of the reservoirs. At both Moose Dam and Deadman Dam, the structures are intact enough to allow one to observe that the openings left for the sluices are as deep as the dams themselves (i.e., they extend from the top of the dam to the base).

At Moose Dam and Allen Dam, the remains of planks used to side and floor the sluices were observed. At Moose Dam, siding consisted of a double thickness of planks which extended the width of the dam, their long axes oriented horizontally and parallel to the stream's direction (Figure 5b). A similar arrangement comprises the flooring of the one observable sluice at Allen Dam. Still visible in the wood

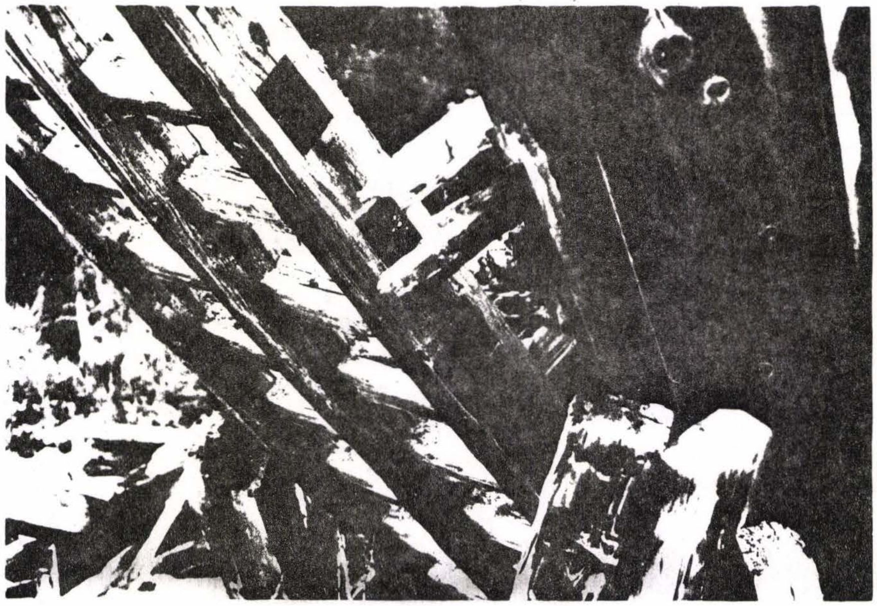


Figure 6a: Detail of an Intact Lift Gate at Moose Dam. Taken near the base of the gate, this photograph shows the uprights, the rungs, and the manner in which they were joined. Wooden pegs may be seen in the ends of rungs at the upper left-hand side of the photograph.

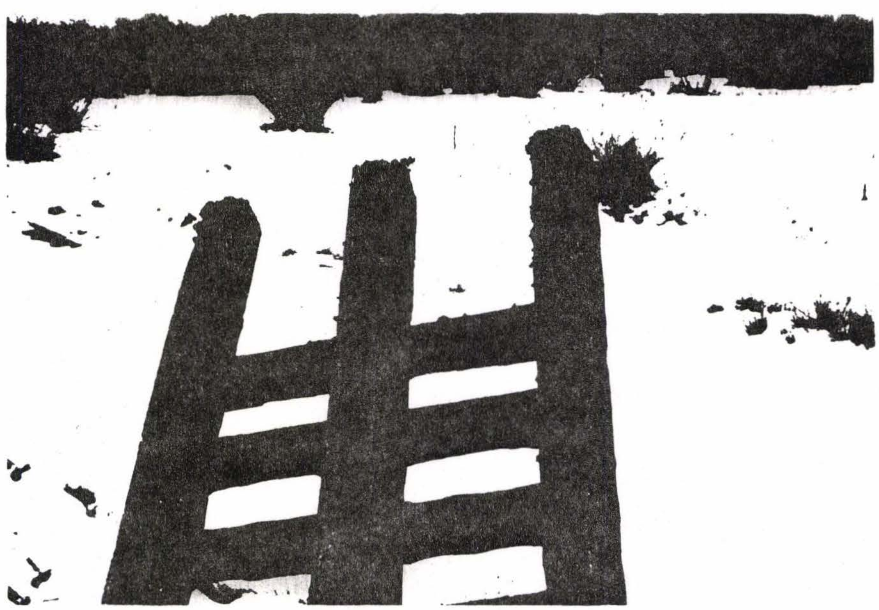


Figure 6b: The Top of a Lift Gate at Moose Dam. This view of the same gate shown in Figure 6a is also looking east. The three wooden uprights and the rungs may be seen. The gate is 44 inches wide.

planks at both dams are marks which indicated that they were adzed to their present dimensions--about 4 by 8 inches.

Each dam evidently had two sluices; two are recognizable at Moose Dam, and Deadman Dam also has two. Each of these dams has a short segment of log cribbing which spaced their sluices. At Allen Dam, only one sluice is evident, but it adjoins a buried portion of the structure. A second sluice, if it exists, may be concealed in the buried deposit.

Apparently present for the purpose of controlling the flow of water through the sluices are ladder-like arrangements interpreted as being lift gates (Figures 6a, 6b). Each gate observed was built with three upright wooden supports and a series of closely-spaced wooden rungs, with no device for filling the interstices between the rungs apparent. Again, as evidenced by marks in the wood, the uprights and rungs were squared with adzes. Pieces of the gates were fastened together with wooden pegs (Figure 6a).

Remains of two lift gates were found at Moose Dam. One of these is primarily intact (Figures 6a, 6b), but its total length is partially concealed by the dam's wreckage. The visible portion measures 19 feet in height and 44 inches in width (the dimension perpendicular to the stream's course); the other gate, now fragmentary, was apparently of similar dimension. The remains of two lift gates also occur at Deadman Dam. Here, the uprights of both gates are intact, and are 17 feet high. Vandalism (chain saw) has made

it impossible to determine the original widths of the gates at Deadman Dam. No lift gates were found at Allen Dam, but it is assumed that since all other aspects of the designs of the three dams are similar, Allen Dam was originally equipped with lift gates. Quite likely, these have been washed away by the creek or are obscured by siltation.

Wooden devices interpreted as being tracks to hold lift gates were observed both at Moose Dam and Deadman Dam. Each of these is a squared column, into one face of which a broad, shallow channel had been cut, so that its appearance is best likened to that of an enormous window sash (Figures 7a, 7b). In cross section, each track is 14 inches by 18 inches (on the side which includes the channel). A total of eight of these remain at 24ME92, there being four each at Moose Dam and Deadman Dam.

All but one of the eight tracks observed have fallen considerably from their original (assumedly) upright positions and are no longer completely articulated with the dam structures; however, a single track at Deadman Dam (Figure 7a) remains nearly in its original position. Because the fallen tracks are each partly concealed by other wreckage, and because the still-upright track extends far above the dam, precise measurements of their heights could not be obtained. At Deadman Dam, though, the still-articulated track stands with over half of its length above the structure, which is 15 feet high.

Figure 7a: A Lift Gate Track at Deadman Dam. This photograph shows the nearly-upright remains of a lift gate track, and one of the attached supports which braced the portion of the track which stood above the dam. The track is the object which extends upward toward the upper left of the photograph; a support is attached to it near center photo. Note the channel in the right-hand face of the track.

Figure 7b: Detail of a Lift Gate Track at Moose Dam. The channel probably meant to accomodate the lift gate is shown in detail in this photograph. Although this is a different track, this view corresponds to the top end of a track like the one shown in Figure 7a. The width of this track is 18 inches.

Figure 7a

(top)

Figure 7b

(bottom)

Portions of an A-frame support which apparently bolstered the segment of this particular track which stood above the dam structure are still in place (Figure 7a), and other similar pieces were observed at Deadman Dam and at Moose Dam. All of this evidence serves to suggest that the tracks stood high enough above the dams to allow the sluices to be cleared completely when a gate was lifted.

Again probably due to siltation or to flood damage, exposed remains at Allen Dam lacked any vestige of lift gate tracks or support apparatus. Since Allen Dam _did_ include at least one sluice, it can only be assumed that it was equipped with gate and track arrangements like those seen at the other two dams.

## Metal Hardware

I have earlier (p. 12) made the statement that, in the construction of the splash dams at 24ME92, a minimum of metal hardware was employed. In fact, only two kinds of hardware were observed: bolts which were used in the supports for lift gate tracks, and spikes used in a number of places, mainly the floors and sides of sluices and the lift gate track supports. Again in the interest of leaving the site intact, I did not remove any of the observed hardware from the site for analysis. Observations were made of the artifacts _in situ_ to the extent possible, a task which mainly involved scrutiny of the heads of spikes and of the

bolts' heads, their threaded ends, and the hexnuts which held them in place.

Spikes were apparently hand-forged. Their heads are noticeably irregular domes, faceted during their formation. The manufacture of bolts is more difficult to interpret. Bolt heads are flat, fairly regular hexagons, and exhibit no discernable evidence of hammer blows. On the other hand, the nuts are highly irregular in thickness and shape, and exhibit on their outer sides faceting suggestive of their having been shaped with a hammer.

The use of hand-forged hardware is consistent with attributes of the construction of the dams, and of their sluice and gate apparatuses, which have already been noted. An impressive amount of handiwork is exhibited in the notching and smoothing of logs in the dams, the manufacture of wooden pegs, the squaring of planks for the sides and floors of sluices, the squaring of pieces to be used in the lift gates and as supports for their tracks, and the squaring and channeling of the tracks themselves, all of which was apparently done using hand tools--axes, adzes, and cross-cut saws.

## The Hauling Road

It has been stated that, under conditions which loggers considered ideal, timber would be harvested from areas contiguous to streams down which logs could then be driven (cf. Roberge 1973). As such areas became depleted of their timber resources, or in cases where this opportunity did not present itself, it was necessary to harvest timber at some distance from a stream and to move logs overland to the water (Cox 1974; Fries 1951; Rector 1953). In non-motorized logging operations, overland transportation of logs was accomplished over one or a combination of the routes known as skid trails, log chutes, and hauling roads.

In the timber harvest and transportation system on Sheep Creek (24ME92), a feature interpreted as being a hauling road exists in Allen Gulch south of Allen Dam (Figure 8). Although the floor of Allen Gulch (a dry canyon) is generally well-forested, a broad, easily-traceable treeless swath exists over some of its length. Observing this phenomenon, I speculated that timber had been removed to enable logs to be hauled down the gulch to Sheep Creek while the site was in use, and that soil compaction due to hauling may have been the agent responsible for precluding subsequent tree growth. The soils in Allen Gulch are silts and silty clay loams (Holdorf 1975:40, 49) which, in dry environments like Allen Gulch,

cause slow reforestation following logging activities (Holdorf 1975:95, 97-98). Soils compacted by the movement of machinery, horses, or even people (e.g. on heavily-used trails) inhibit root development and thus also slow plant growth (George Cameron, personal communication).

With this information in hand, I walked a zig-zag route over parts of Allen Gulch and tested the soil's hardness with a "probe" (in this case, a sharpened length of steel rod of the type used in reinforcing concrete), and found the soil on the treeless path to be considerably more resistant to my body's force than was the adjacent forested ground. I therefore assume that my original speculative interpretation was correct, and that the phenomenon which I observed was evidence of the former existence of a hauling road in Allen Gulch.

## The Log Chutes

Another means of transporting logs over dry land was by the use of devices which took a number of forms, but were collectively known as log chutes (Glossary). In the timber south of Allen Dam, the remains of two log chutes were located. The northernmost of the two chutes (Figure 8) is located just south of Sheep Creek on a steep, timbered slope, down which it descends to the valley floor. Because

it is located on a cool, moist, north-facing slope, decomposition of the wooden remains has been considerably more rapid than is characteristic of the Sheep Creek locale, and only some short segments of the Sheep Creek chute remain recognizable. However, one is able to see the entire route of the chute by virtue of the fact that, while it was in use, ground disturbance and soil compaction were apparently sufficient to have precluded the regeneration of trees. Its route is now marked by a treeless swath several feet across (unfortunately, severe conditions of light and shadow prevented me from getting an adequate photograph). On this evidence, it was determined that the Sheep Creek log chute covers a horizontal distance of about 2500 feet, in which it drops 680 feet.

The other, and by far the more intact, of the two chutes also is located on a steep mountainside, and has its lower terminus at the floor of Allen Gulch (Figure 8). The chute's lower end also coincides with the beginning of the hauling road, which extends down Allen Gulch to Sheep Creek.

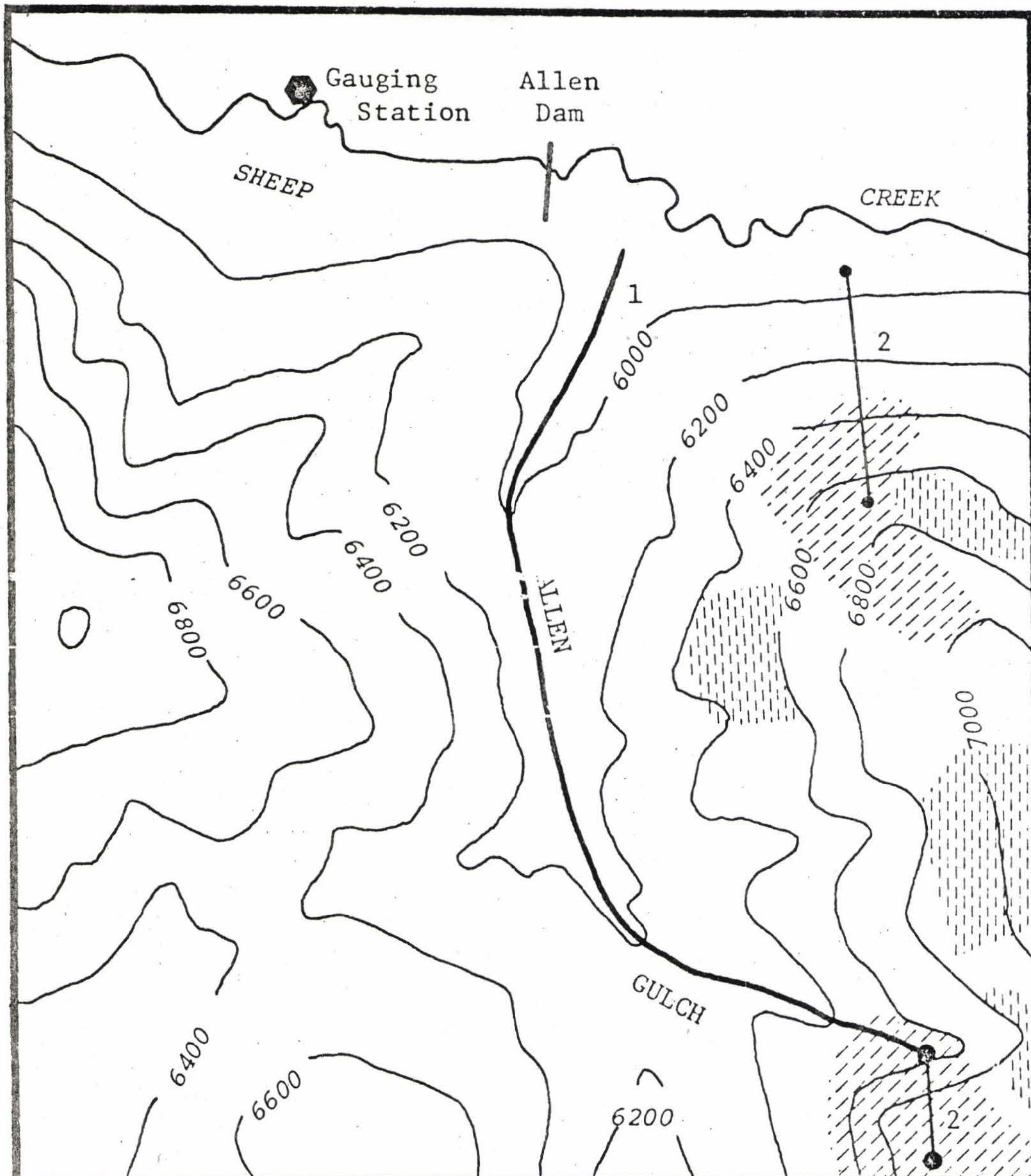
Because it remains recognizable for most of its length (though it has settled and been partly covered by forest duff), one is able to observe in detail the design of the Allen Gulch log chute. It was built of two parallel lines of poles (logs of about 10-inch diameter) laid end-to-end and secured by short crossties which would have prevented the poles from separating under the weight of the logs being slid through the chute. As evidenced by still-visible marks in the wood, each piece was worked with an adze until almost

half of its circumference was removed, thus providing a flat, smooth surface generally six to eight inches in width. When the poles were lain side-by-side, the flat surfaces were turned inward, forming a shallow, V-shaped trough.

At intervals of 15 to 20 feet along the chute's 1056-foot length, thick iron spikes were driven up from beneath the chute and allowed to protrude slightly at the bottom of the trough. The spikes were apparently hand-forged from 1.5-inch diameter cylindrical stock, the ends pounded to a pyramidal point. This feature was observed on six spikes which had become separated from the chute due to decomposition of the wood. A possible explanation for the function of the spikes is suggested by the fact that nearly all of the Allen Gulch chute's 360-foot drop is accomplished in the lowermost 800 feet of its length, the remainder having a relatively slight incline. On the steep portion of the chute, it is conceivable that logs being conveyed could develop extremely high rates of speed and be in danger of leaving the chute, or worse, tearing it to pieces. Protruding spikes would have impeded the progress of travelling logs, allowing them to move more slowly and to arrive at the bottom safely, if scraped somewhat.

At the upper end of the Allen Gulch log chute, a pair of logs lain parallel to one another and butted at a right angle against one side of the chute is suggestive of a ramp for loading logs into the chute.

Figure 8: Some Components of the Sheep Creek Timber Harvest and Transportation System. Shown on the map are Allen Dam (indicated), the hauling road in Allen Gulch (1), both log chutes (2), and the gauging station operated by the U. S. Geological Survey between 1942 and 1972 (see pp. 56-59, below). Timber harvest areas ("cutting units") recorded as part of site 24ME92 are indicated, as are present clearcuts. Other cutting units are located to the east of this map.




LEGEND

NORTH

Cutting Units of Site 24ME92

Existing Clearcuts (1979)

Contour Elevations Are in Feet above Mean Sea Level

Scale: 2.64 Inches Equal One Mile

## The Timber Cutting Units and Log Decks

On the mountain slopes and ridges south of Sheep Creek, and ranging in elevation from 5920 to about 7000 feet, is evidence of former timber harvest activities. Not visible from the valley bottom because regenerated trees screen them from view, cutting units--the areas from which timber was harvested--are nevertheless detectable in the present timber stands because the rotting stumps remain upright. A walk through the present forest reveals the stumps of large Douglas-fir trees (many with diameters of greater than 24 inches), the same species as now occupies the formerly cut-over stands. Because nearly all of the more recent timber harvest south of Sheep Creek has taken place in the last 26 years (George Cameron, personal communication), the old cutting units are relatively easily demarcated (Figure 8).

Within cutting units, seven features designated as log decks were observed. These are stacks where logs, already limbed and bucked (Glossary), were lain, row upon row, perhaps to await transfer to another location. Bucked logs which comprise the decks are uniformly of 15 to 15.5 feet in length in all decks (assumedly the logs have shrunk somewhat as they have dried on the ground).

## Dating the Site

An opportunity to quickly and precisely date site 24ME92 presented itself by virtue of the fact that trees grow today on soil which was disturbed by the construction and use of some of the component features of the Sheep Creek timber harvest and transportation system. In order to arrive at a date for the site as a whole, and to establish firmly the association of the various features observed and described above, the ages of a number of trees now growing on formerly disturbed soil were obtained. This was done by the author using an increment bore, basically a hollow bit which is screwed into the tree to be dated, allowing the user to extract a small cylindrical "core" showing the tree's annual growth rings. Using this technique, an attempt was made to date several of the features at site 24ME92.

At Moose Dam, two lodgepole pines growing on soil disturbed by construction at the south end of the dam were aged at 80 and 81 years. An Englemann spruce growing in the borrow pit at Allen Dam was aged 60 years, and another growing on the gravel banked against the dam itself is 72 years old. A subalpine fir which germinated between the rails of the Allen Gulch log chute's "loading ramp" is 84 years old.

Because no trees have regenerated in the paths of either the Sheep Creek log chute or the hauling road on Allen Gulch, these could not be dated. No opportunity to date Deadman Dam presented itself, due primarily to the limited extent of its intact remains. Trees growing in the cutting units are of visibly mixed ages, ranging from young saplings to gnarled old snags that probably were there considerably before the logging activity with which the site is associated. To try to assess the date of timber harvest based on any sample of the ages of living trees in the cutting units appeared futile, and was not attempted.

Since the five increments obtained were taken in the fall of 1979, five dates for the corresponding features are suggested: 1895, 1898, 1899, 1907, and 1919. For two reasons, the latter two dates, 1907 and 1919, are rejected. First, they diverge quite considerably from the other three dates, which cluster within four years of one another. Secondly, and most importantly, it was realized after these increments were taken that because the borrow pit at Allen Dam was excavated well into mineral soil, and because the dam was banked with sterile gravel, trees would not immediately have been able to germinate either in the pit or on the dam after these were abandoned. It was therefore concluded that these particular dates were not reliable.

As a result, it is concluded that the site was used during the mid- to late-1890s, probably not much before 1895.

## The Features of Site 24ME92 Considered as a System

That apparently reliable dates could be obtained for only two of the features at 24ME92 (Moose Dam and the Allen Gulch log chute) came as a minor disappointment. A determination of the contemporaneity of the site's features had seemed basic to establishing the site as a cohesive resource procurement system. In a sense, however, tightly-clustered dates for all of the site's features would only have served to further justify what I already felt that I "knew" about the site after making the inventory, namely that I had observed the remains of a single, integrated resource procurement system.

I have tried to demonstrate in this respect that the splash dams were functionally and morphologically equivalent to one another by comparing certain attributes--the design of lift gates, their tracks, and sluices--of each dam. All three are of similar, if not identical, design and construction. In the same vein, the use of hand tools and hand-forged hardware in all three splash dams and in the Allen Gulch log chute might allow these to be associated. Perhaps most convincing, however, is the spatial distribution of the site's features, a distribution which should allow them to be firmly associated with one another. Log decks are located in timber cutting units. The Sheep Creek log chute leads from a

cutting unit to the valley bottom; similarly, the Allen Gulch log chute leads from a cutting unit into the gulch, from which point the hauling road extends the remainder of the distance to Sheep Creek. Once in the Sheep Creek valley, a water route provided by the splash dams would have enabled the loggers to continue moving logs down Sheep Creek, away from the mountains and presumably toward the point(s) at which they were finally marketed (Figures 2 and 8).

In Chapter IV it will be proposed that the timber resource being exploited on Sheep Creek would have been moved through the timber harvest and transportation system in precisely the order just described. First, however, I turn in Chapter III to the second stage of archaeological analysis, that of obtaining historical analogs with the objective of identifying the types of human behavior which may have resulted in the deposition of materials like those encountered at site 24ME92.

# CHAPTER III

# HISTORICAL LOGGING-TRANSPORTATION METHODS

## Comments on the Use of Analogy

Analogy is used as an analytical tool in archaeology in varying ways. In examining some of those uses, Yellen (1977:3) finds that:

> For a priori hypothesis formation as well as the after-the-fact cultural interpretation of observed patterns, one needs some feeling or idea of what may consititute a reasonable explanation. In some subjective way, one must be able to ask how "reasonable" the results appear. To meet these ends, recourse to analogy--whether ethnographic or other--provides a most expedient and perhaps unavoidable approach.

One advocate of the use of analogy for "a priori hypothesis formation" is Binford (1972:49), who would have the archaeologist use analogy to "provoke certain types of questions which can, on investigation, lead to the recognition of more comprehensive ranges of order in the archaeological data."

Since the preceding chapter is an explanatory narrative as well as it is a presentation of evidence, I will use analogy, in Yellen's "after-the-fact" sense to determine whether the explanations offered are reasonable in comparison to historical knowledge of the sorts of logging devices that were observed on Sheep Creek. I will then employ analogs in the Binfordian sense, to derive testable hypotheses concerning people's use of the Sheep Creek

timber harvest and transportation system.

To these ends, historical literature pertaining to logging operations conducted in Montana (other than on Sheep Creek) and elsewhere in the United States was examined, the object of the research being to find references to the design and use of logging devices like those observed archaeologically on Sheep Creek. Data from a variety of locations, and many different years in the period 1875 to 1929 have been incorporated into this chapter. The references are a cross-section of the types of material available, including "oral history" accounts of men who were actually involved in the operations discussed (i.e., Dyche 1964; Kephart 1976; MacKenzie and Maunder 1972; Ransom 1969; Roberge 1973; Rutledge and Tooker 1970), regional logging histories written by non-participants (Cox 1974; Fries 1951; Lynn 1976; Rector 1953), topical histories written by non-participants (Hutchinson 1973; Margolin 1911; Schon 1971), and a general study of logging-transportation methods (Brown 1936). All of the references have an important attribute in common--they concern non-mechanized logging operations.

In the discussion which follows, historical information is presented in categories which correspond to the designations given the features of the Sheep Creek timber harvest and transportation system.

## Log Decks

Placing bucked logs in piles where they awaited transfer to another location, a practice to which loggers referred both as decking and "yarding" (Rutledge and Tooker 1970), has persisted from early days to the present (Roberge 1973). The choice of the location for log decks or yards varied with the technique ultimately to be used in moving logs from harvest to market, but was commonly conditioned by environmental factors. In some log drives, particularly those conducted in timber bordering a large stream or river, logs were decked on the banks of the stream to be floated (Roberge 1973:45-47). As operations moved away from the water, it was considered more expedient to locate log decks inland, either near or within the cutting units (Kephart 1976:209). Rector (1953:77) reports that sixteen feet "was supposed to be the mystical number" of the desired size of logs to be bucked. It will be recalled that on Sheep Creek, log decks do exist in the cutting units, and consist uniformly of 15- to 15.5-foot logs.

## Log Chutes

Log chutes similar to the features so designated in the Sheep Creek timber harvest and transportation system are described in several studies of logging elsewhere in the United States. Reporting on the use of chutes in the California Sierras between 1875 and 1878, Hutchinson (1973:17) notes that "chute sides were adzed to make a trough. The ends of [logs being conveyed] were 'sniped' [tapered] to provide easier transit". When necessary, chutes were built on level ground where it was necessary that draft animals pull logs through them, but gravity was apparently a preferred motive force, and many chutes were built on an incline. In 1909, Jay George Ransom (1969:4) participated in a log drive to Boise, Idaho, and has provided an interesting account of log chuting:

> The chute itself consisted of 8-inch poles laid 24 inches apart, barked and smoothed with axle grease. When ready, the teamster threw a chain hitch around the sniped butt, chirruped to his horses, and the one-ton log moved slowly forward and up onto the chute to be slid down to the landing. On steep slopes, the logs shot down dizzily, but on level stretches, horsepower prevailed. No machinery of any kind was available. The amount of animal and human energy required to transport a 200-ton tree from stump to mill can hardly be imagined today.

Ransom does not disclose any method used to keep logs from attaining excessive speeds as they hurtled through the greased chutes. Perhaps in this particular case no such difficulty emerged, but there are

indications that in most cases, it did. In a general study of logging transportation, Brown (1936:144-145) reveals that the deceleration of logs in chutes was often necessary, and reports that spikes driven into the chutes were frequently used to accomplish this purpose.

That the chutes used in the Idaho logging operations in which Ransom (1969) participated were lubricated with axle grease is a point more important than it may seem. It was essential to lubricate log chutes, and this was done using lard (grease), water, or ice, or by shovelling snow into the chute (Brown 1936:144-145). Depending upon the prevalence of cold weather and snow in the area being logged, the choice of a lubricant could be determined by the season in which the chutes were being used. As lubricants for log chutes, snow, ice, and water are quite ephemeral, and one would not expect any evidence of their use to remain long after a chute fell into disuse. Neither would grease or lard be expected to be observable long after the fact, certainly not in an archaeological context. Yet archaeologists working in western Montana and in northern Idaho report that an artifact distribution pattern common in cases where chutes were <u>greased</u> is the occurrence near the chute of discarded metal containers, and even of small makeshift stoves used in softening grease for its application (Milo McLeod, personal communication; Simone Carbonneau, personal communication).

The log chutes described by Ransom (1969:4) and by Hutchinson (1973:17) are directly analogous to the ones found at 24ME92 and

described above (pp. 28-30). In Chapter IV, I will return to consider the implications of log chute lubrication for 24ME92.

## Hauling Roads

Before mechanized logging, two types of log hauling roads predominated in the United States. In one form, the route to be followed was embellished with logs placed on the ground across the road and greased for fast action (Cox 1974:228). Aptly called a corduroy road, this type would accommodate massive loads which were usually in the form of strings of logs pulled by several oxen. In areal studies of logging transportation in the Pacific Northwest and in the Great Lakes States, Cox (1974) and Rector (1953), respectively, agree that corduroy roads were economical over distances up to 1.5 or 2 miles.

For greater distances, an efficient, yet effective hauling method involved the use of horse-drawn sleighs, climate permitting (Cox 1974; Rector 1953). Rector (1953) notes that hauling roads over which sleighs were to be used were graded where steep slopes would be encountered, but were otherwise basically unimproved save for the removal of timber from the roadway. Apparently, a sleigh

drawn by four horses could carry a respectable load of logs. Describing just such a case, Rector (1953:214) writes,

> The runners (of the sleigh) were five inches thick, eleven inches high, and they were set nine feet apart. The estimated weight of the sled and the chains used for binding was five tons, and when loaded the estimate of the weight of the logs ranged from one hundred tons to one hundred and fifty tons.

It seems reasonable to expect that the movement of a load of weight, whether borne by horses pulling a sleigh or by oxen pulling logs, could result in soil compaction of a nature similar to that observed in the Sheep Creek timber harvest and transportation system. In fact, Rutledge and Tooker (1970:25), in comparing pre- and post-mechanized logging operations, note that the earlier practice of "skidding" logs over the ground resulted in the soil being compacted to a concrete hardness.

The feature on Sheep Creek interpreted as being a hauling road is thus accepted as the observable result of log hauling as described by Cox (1974) or by Rector (1953). I will return in Chapter IV to an assessment of which of the two techniques discussed was actually the one used on Sheep Creek.

## Splash Dams

The historical literature is replete with references to log drives in which splash dams were used (e.g., Cox 1974; Dyche 1964; Kephart 1976; Rector 1953); however, whereas these discuss the actual log drives very thoroughly, their treatment of the structural attributes of splash dams is very sketchy. An exception is the report by Kephart (1976:207), who describes an earth-covered splash dam used in the State of Maine during the 1920s, and who provides the following information about its design and operation:

> For [the purpose of sluicing logs and maintaining stream flow], a heavy timbered sluiceway [is located] midway along the length of the dam. It has a solid, timbered deck or bridge in a line with the crest of the dam. Flowage through the sluiceway is controlled by three lift gates. Each gate is made of heavy planks set loosely in a frame, each plank on top of another, and with the frame held between guides. With all planks in place, they form a barrier from floor to crest of the dam. Each gate can be raised and lowered, like a sash window, using long prybars to do the lifting.

With slight differences, this description comes remarkably close to depicting the features of the Sheep Creek splash dams interepreted as being lift gates, lift gate tracks, and sluices. Even the exhaustive study of logging transportation in the United States and Canada by Brown (1936) did not produce an example of sluice and lift gate design which so closely resembles that found on Sheep Creek.

Kephart's report is not alone as an example of the type of construction suggested for the dams at 24ME92, however; in a collection of old logging-related photographs housed at the University of Montana Archives, I located the picture shown in Figure 9, which was labelled simply, "Western Washington, probably around 1910." The resemblance between this dam (Figure 9), especially its gate and sluice structures, and the dams seen on Sheep Creek (Figures 6a, 6b, and 7a) truly is quite remarkable.

## Scheduling

At the outset of this paper, I stated that my initial impressions of site 24ME92 led me to speculate that logging operations there had been sequentially staged (p. 2, above). Historical references were thus examined with particular attention devoted to a determination of the soundness of this idea. Logging operations reported in the historical literature for areas of the United States other than Sheep Creek often were divided into discrete "tasks" staged sequentially, often in response to favorable environmental conditions (cf. Dyche 1964; Kephart 1976; MacKenzie and Maunder 1972; Rector 1953). Some flavor of the reliance upon advantageous environmental conditions has been imparted in the discussions of log chutes and hauling roads presented

Figure 9: A Splash Dam Used in Western Washington Around 1910. This is a view looking upstream at a portion of a splash dam which exhibits design similar to that proposed for the Sheep Creek splash dams. Compare the gates shown to Figures 6a and 6b; also compare supports for the left-hand gate in this photograph to Figure 7a. Note the design of the dam itself, which shows to the left of the center of the photograph. A long "bulkhead" extends across the photograph (and also across the direction of stream flow), and is supported at intervals by cross-timbers. The stream issues from the sluice at right-center, and can be seen leaving the dam at bottom right. No scale was provided in the original photograph, but some idea of scale is given by the ladder which is seen between sluices.

(Photograph courtesy of the University of Montana Archives, Missoula)

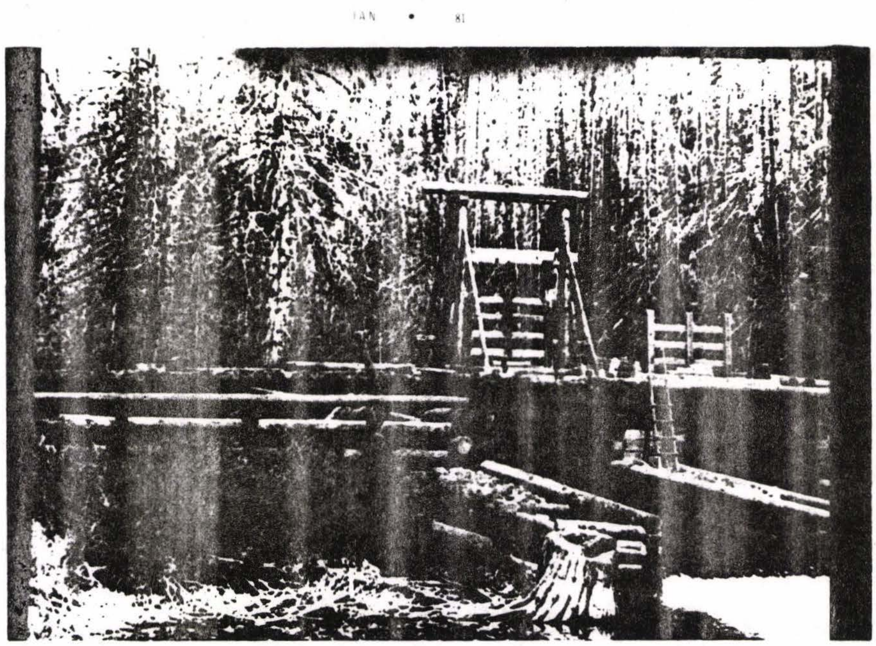


Figure 9

above (pp. 40-43); however, the historical literature indicates not only that the performance of certain tasks was adapted to environmental variables, but that tasks were often scheduled to coincide with the existence of certain environmental conditons.

For example, William Dyche (1964), who directed an operation in Wyoming between 1906 and 1909, preferred to haul logs in winter because of the ease with which they could be moved over snow. At an operation in western Montana, the conveyance of yarded logs was deferred until "wintertime came, along with the snow and the ice, (at which time) they'd slide the logs, feed them right to the landings" (MacKenzie and Maunder 1972:13). Another case of task scheduling, in which tasks were actually prioritized seasonally, is documented by Rector (1953:209), who reports that in many operations in the Great Lakes region,

> cutting and assembling [logs] at strategic points continued until sufficient snow had fallen to make "good sleighing." Then almost half of the crew was discharged and the remainder loaded logs onto the sleighs at the skidways and hauled them to the riverbank landing, or rollways [quotes in original; emphasis added].

Most of the operations researched by Rector (1953) included log drives, sometimes aided with the use of splash dams.

A succinct report of the calendar for an entire logging and log driving operation is given by Kephart (1976:209) for an operation in which he participated in Maine in the 1920s:

> Thinking back on those two million sticks [logs] and considering them against today's highly mechanized technology, my back aches to think how many times each of those two million

> sticks was picked up and moved by hand. From the ground where the tree was felled and cut into four-foot lengths, each stick was hand-loaded on a horse-drawn sledge and hauled to the edge of a hauling road, or it was tossed to the roadside from nearby trees. Here it was handpiled into cordwood stacks. That winter each stick was hand lifted from the stack and loaded on a hauling sled, thrown off at the landing, and sometimes restacked into high tiers [where they remained until the drive began in spring].

Although Kephart uses a regional terminology which differs somewhat from the terminology used in the West to describe logging and log transportation devices, it is apparent that he is describing the use of features of the sort now evidenced at 24ME92. He mentions cutting trees into four-foot lengths (bucking), piling "sticks" (logs) into cordwood piles (log decks), and moving logs to streamside landings over hauling roads. This particular operation apparently did not incorporate log chutes. In the next section, the possible implications of historically-documented scheduling of logging tasks are discussed for Sheep Creek.

## Implications for Sheep Creek

On the basis of the above discussion, it is concluded that the log decks, log chutes, the hauling road, and the splash dams which remain on Sheep Creek are analogous to certain historically-known logging and transportation devices (Chapter II and pp. 37-45, above). The features at 24ME92 interpreted as being log decks, log chutes, splash dams, and a hauling road are functionally and morphologically analogous to devices documented historically, regardless of some

discrepancies in the terms used to describe them (p. 48, above), and interpretations regarding the functions of the features at 24ME92 are accepted on this basis. This is analogy used in an "after-the-fact" cultural interpretation (Yellen 1977:3).

Beyond allowing functional explanations of the things observed at 24ME92 to be accepted, however, historical analogs may be used to synthesize a set of behavioral norms apparently shared between the logging operations studied, and to hypothesize that these would have been the rule on Sheep Creek as well. First, the total range of activities (tasks) in a logging operation was divided into a set of discrete events staged sequentially by the group (Cox 1974; Dyche 1964; Kephart 1976; Ransom 1969; Rector 1953). Second, tasks in a logging operation were scheduled to coincide with favorable conditions of environmental variables (Dyche 1964; Kephart 1976; MacKenzie and Maunder 1972; Rector 1953). Third, environmental variables were accompanied by corresponding technological adaptations (Brown 1936; Cos 1974; Rector 1953). A fourth, discussed only by Rector (1953: 209) in his areal treatment of logging transportation, is that tasks were prioritized in response to conditions of environmental variables.

Implications for the archaeological record on Sheep Creek may be drawn from these norms (following Binford 1972:48) given that the behavioral contexts of both the remains at site 24ME92 and the historically analogous operations are the same (i.e., non-

mechanized logging), and that their temporal contexts are similar (*ca*. 1895 for 24ME92, and between 1875 and 1929 for its analogs):

(1) If the tasks in the operation now evidenced by site 24ME92 were staged sequentially, and if tasks were prioritized in response to conditions of external (in this case, environmental) variables, then some tasks could have been discontinued before their potential for production was exhausted. It was this sort of consequence that Rector (1953:209) reported (cited on p. 47, above).

(2) If tasks performed at site 24ME92 were scheduled to coincide with favorable environmental conditions and if certain environmental conditions were accompanied by corresponding technological adaptations, then there should be a corresponding distribution of technological elements (artifacts) over task loci.

In the next chapter, I will develop inferences concerning the seasonality and sequencing of tasks in the logging operation conducted at 24ME92 based in part upon an examination of the archaeological record in light of these implications. The derivation of inferences concerning the use of the Sheep Creek timber harvest and transportation system, as detailed in Chapter IV, corresponds to the third research stage discussed above (p. 4).

# CHAPTER IV

# TASK SEASONALITY AND SEQUENCING INFERRED

## Timber Harvest

The seasonality of timber harvest activities--that is, those conducted in the cutting units--on Sheep Creek may be inferred by using a combination of archaeological observations made at site 24ME92, environmental data, and historical analogs. Observing tree stumps in the cutting units, I found that some trees had been very closely cropped, leaving short stumps, but that a significant number were cut high above the ground, leaving stumps as high as 40 inches in some cases. No cause for "high-stumping" trees was observable; stumps do not show damage due to fire or infestation, rather, the leavings appear in all cases to be perfectly usable wood. The choice to high-stump trees, it would seem, was affected by some presently unobservable condition, perhaps snow accumulations which could have precluded cutting beneath a certain point on the tree.

Despite Montana's frigid winters, winter logging was common throughout Montana and the United States, and in some instances, was actually a preferred technique. Working high in the Bighorn Mountains on the Wyoming-Montana border from 1906 to 1909, Dyche (1969:10-14) favored winter logging, and, at Seeley Lake in western Montana, MacKenzie cut timber in winter as a rule before the advent of mechanized timber harvest and transportation (MacKenzie and Maunder 1972:13). In neither of these reports, nor in any of numerous other

accounts of winter logging, is there any mention of high-stumping trees during winter logging operations. In fact, Roberge (1973) depicts a modern logger shovelling snow away from the base of a tree which he is about to cut. However, it could be pointed out that the Sheep Creek loggers were probably using two-man cross-cut saws to fall trees (cf. Rector 1953:76-77), and it may not have been economical for them to have cleared an area large enough to have accommodated both men.

Winter snow accumulations on Sheep Creek are generally near the level suggested by stump heights in the cutting units. During the winter of 1978-1979, one locally considered to have been comparatively dry, a snow depth of greater than 20 inches persisted from December 3, 1978 through March 10, 1979 at a weather station located six miles south of Sheep Creek (U. S. Department of Commerce 1978a:18, 1979a:18, 1979b:18, 1979c:18). During the month of February, 1979, daily snow-depth readings averaged 27.5 inches, with a recording of 29 inches as the winter's maximum (U. S. Department of Commerce 1979b:18). The timber cutting units on Sheep Creek are generally 1000 to 1600 feet higher in elevation than is the weather station from which these data come, and one should expect a correspondingly greater snow depth to have persisted in the area of the cutting units.

It is inferred, based on these data, that both warm weather (summer and fall) logging, as represented by short stumps, and winter logging, as indicated by tall stumps, were conducted at site 24ME92.

## Chuting Logs

I have emphasized the importance of log chute lubrication, and have noted that the lubricants generally used could be divided into those used in warm weather (grease or water) and those used in cold (snow or ice). I have also reported an artifact distribution pattern described to me by two Forest Service archaeologists who have worked in western Montana and northern Idaho (McLeod and Carbonneau, respectively), which enables one to recognize chutes which were lubricated with grease or lard based on the occurrence of certain kinds of metal artifacts (p. 41, above). Given this pattern, and knowing that log chutes were lubricated as a rule, one could expect that if grease had been used in lubricating the log chutes at site 24ME92, then one would find evidence thereof.

In making the site inventory, the only metal remains which I found associated with either of the log chutes were the already-mentioned iron spikes (p. 30, above). After learning of the pattern of artifact distribution which had allowed others to recognize grease-lubricated chutes, I returned to 24ME92 (p. 4, above) to make certain that there were no such remains adjacent to the Allen Gulch or the Sheep Creek log chutes. I walked the lengths of both, giving particular attention to areas peripheral to the chutes, and again found no metal artifacts other than spikes. It was concluded, therefore, that grease was not used in lubricating chutes.

This leaves water, ice, and snow as possible alternative lubricants. Water, and therefore ice, could have been carried to the Sheep Creek chute from the creek itself, but this would have involved a distance of 3/4 mile and a climb of almost 700 feet. There is not a reliable water source within reach of the Allen Gulch chute, and it seems unlikely for this reason that it would have been lubricated with water.

It is inferred that the Allen Gulch chute, and perhaps the Sheep Creek chute as well, were used in winter, when they could be slicked with snow, a commodity which is plentiful in the area for about three months of the year.

## Hauling Logs

Historical analogs provide two implications which may be applied to make inferences concerning the use of the hauling road in Allen Gulch. It has been established (pp. 42-43, above) that in cases in which logs were to be hauled over a distance greater than about 2 miles, loggers preferred the use of sleighs over the alternative of using a corduroy road and oxen. The hauling road at site 24ME92 covers a distance of about 3 miles. Most likely, then, the loggers on Sheep Creek would have elected to use sleighs in hauling logs down Allen Gulch.

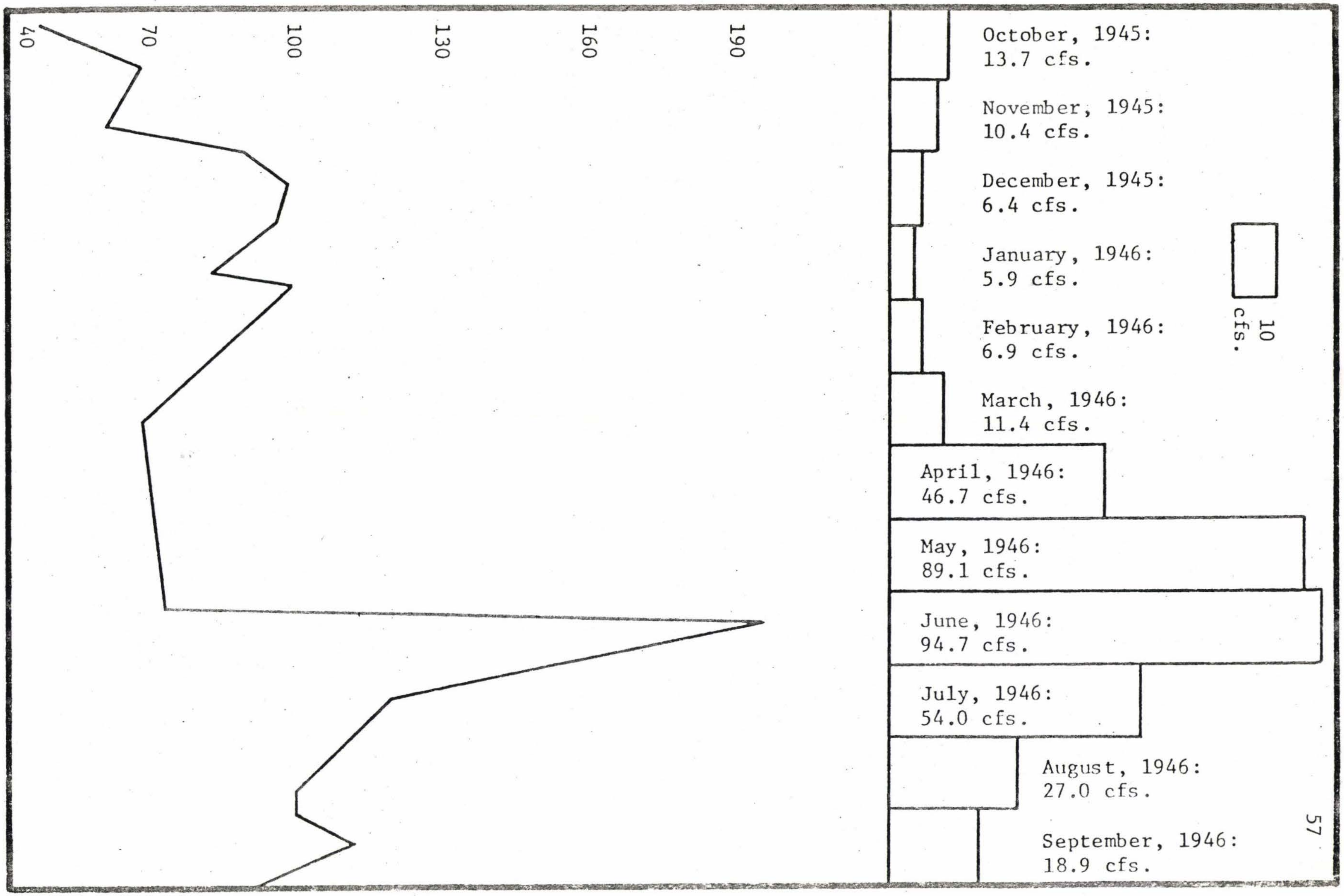
A rigorous test of this hypothesis may be made using one of the implications listed in Chapter III (p. 48). Given that the use of sleighs requires snow, and that hauling roads on which sleighs were used were only improved when steep grades were encountered (p. 42, above), and given that the gradient of Allen Gulch is a gentle 4.3% (Figure 8), the following hypothesis may be stated: If the use of the hauling road in Allen Gulch had been scheduled to coincide with winter snow, and if an improved roadbed were not required for its use in snow, then one could expect that an unimproved roadbed would have been used. One would accept the hypothesis that logs were hauled in winter (using sleighs) if an unimproved roadbed were encountered in Allen Gulch, and reject the hypothesis under alternate circumstances.

I have been over the route of the Allen Gulch hauling road eight times, under various lighting conditions, and have observed (1) that no portion of the route was artificially graded, and (2) that no evidence of the former presence of an improved roadbed such as a corduroy road exists. It is inferred, therefore, that the loggers who worked at 24ME92 hauled logs down Allen Gulch in winter, when sleighs could have been used.

## Driving Logs

The scheduling, or timing, of log drives on Sheep Creek may be inferred from historical knowledge of drives conducted elsewhere in the United States, in combination with environmental data from Sheep Creek. Historically, it was true that practically all log drives were conducted in springtime, coinciding with high stream levels caused by snowmelt and/or spring rains, a fact which prevailed whether or not the drive was assisted by splash dams (Dyche 1964; Fries 1951; Kephart 1976; Ransom 1969; Rector 1953; Roberge 1973). The discharge characteristics of Sheep Creek (that is, its seasonally fluctuating volume of flow) suggest that the drives which employed the 24ME92 splash dams must have conformed to the historically known pattern. Sheep Creek is narrow, shallow, and slow-moving during the entire year except spring, when snowmelt and rain swell it considerably.

Figure 10: Discharge Characteristics of Sheep Creek. The bar graph (top) shows monthly averages for the Water Year 1945-1946. Notice that the creek's discharge tends to be extremely low during the fall and winter months, with significantly greater discharge in the spring (May and June). The line graph (bottom) shows the fluctuations in daily discharge rate for the period of April 16, 1946 (left-hand side of graph) to June 15, 1946 (right-hand side of graph). The tall peak occurs on May 28, and represents the greatest discharge rate for the entire Water Year of 1945-1946. The abrupt rise is characteristic of spring floods, which usually build and subside very rapidly. In the figure, the point where the curve begins to rise steeply represents May 27, when the creek's flow measured 72 cubic feet per second (cfs), and the tip of the peak is the very next day, May 28, by which time the rate of discharge had jumped to 194 cubic feet per second. All data are taken from the U. S. Geological Survey (1949:78) Water Supply Paper for 1946.


40
70
100
130
160
190
October, 1945:
13.7 cfs.
November, 1945:
10.4 cfs.
December, 1945:
6.4 cfs.
January, 1946:
5.9 cfs.
February, 1946:
6.9 cfs.
March, 1946:
11.4 cfs.
April, 1946:
46.7 cfs.
May, 1946:
89.1 cfs.
June, 1946:
94.7 cfs.
July, 1946:
54.0 cfs.
August, 1946:
27.0 cfs.
September, 1946:
18.9 cfs.
10
cfs.

Between 1942 and 1972, the United States Geological Survey operated a stream discharge gauging station on Sheep Creek, just a half-mile below Allen Dam. Data obtained at this station show that the creek's volume of discharge averages only 29 cubic feet per second over an entire year (U. S. Geological Survey 1974). Averages, of course, tend to mask variability, and this case is certainly no exception. Included in the computation of an average for the year are about ten months when discharge is below 29 cubic feet per second, and a two-month period when discharge is considerably above average--the spring flood (Figure 10).

The Geological Survey data may be used to arrive at an estimate of the parameters--the beginning and ending dates--for the spring flood in a "typical" year, which in turn can serve as a basis for inferring the timing of the drives now evidenced by the remains at 24ME92. For every year in the period of record except 1943, the discharge data include include a note of the date on which the spring flood reached its peak (cf. U. S. Geological Survey 1959, 1964, 1969, 1974). An assessment of the most likely date for the occurrence of the spring flood's peak may be made by taking the mean of all peak dates; if this is done, the mean (i.e., most likely) date for the spring's peak discharge is May 28. If a 98% confidence interval is built around this date, one may say that in 98% of all years, annual spring flooding will occur on Sheep Creek between April 29 and June 26.

Given that the period of high water which occurs every spring on Sheep Creek tends to arrive and depart fairly rapidly (U. S. Geological Survey 1949, 1953, 1955), it is inferred that the typical spring log drive could not have begun much earlier than April 29, and could not have been continued much past June 26.

## Task Sequencing

The inferences regarding seasonality in the Sheep Creek timber harvest and transportation system may now be summarized, and explicit propositions concerning the sequencing of activities may now be made. The entire range of activities conducted in the system has been divided into four tasks: timber harvest, log chuting, log hauling, and log driving. Of these, the latter three depended (or so it has been proposed) upon the presence of season-specific environmental conditions for their successful execution; hence, these tasks would have been sequenced according to the occurrence of their requisite environmental circumstances. It should thus be possible to infer a calendar for the entire operation.

Timber harvest would have begun the yearly cycle--a necessary starting point since without timber there would have been no reason to perform the other tasks--and would have occupied the warm months of summer and fall, and would probably have been continued into the

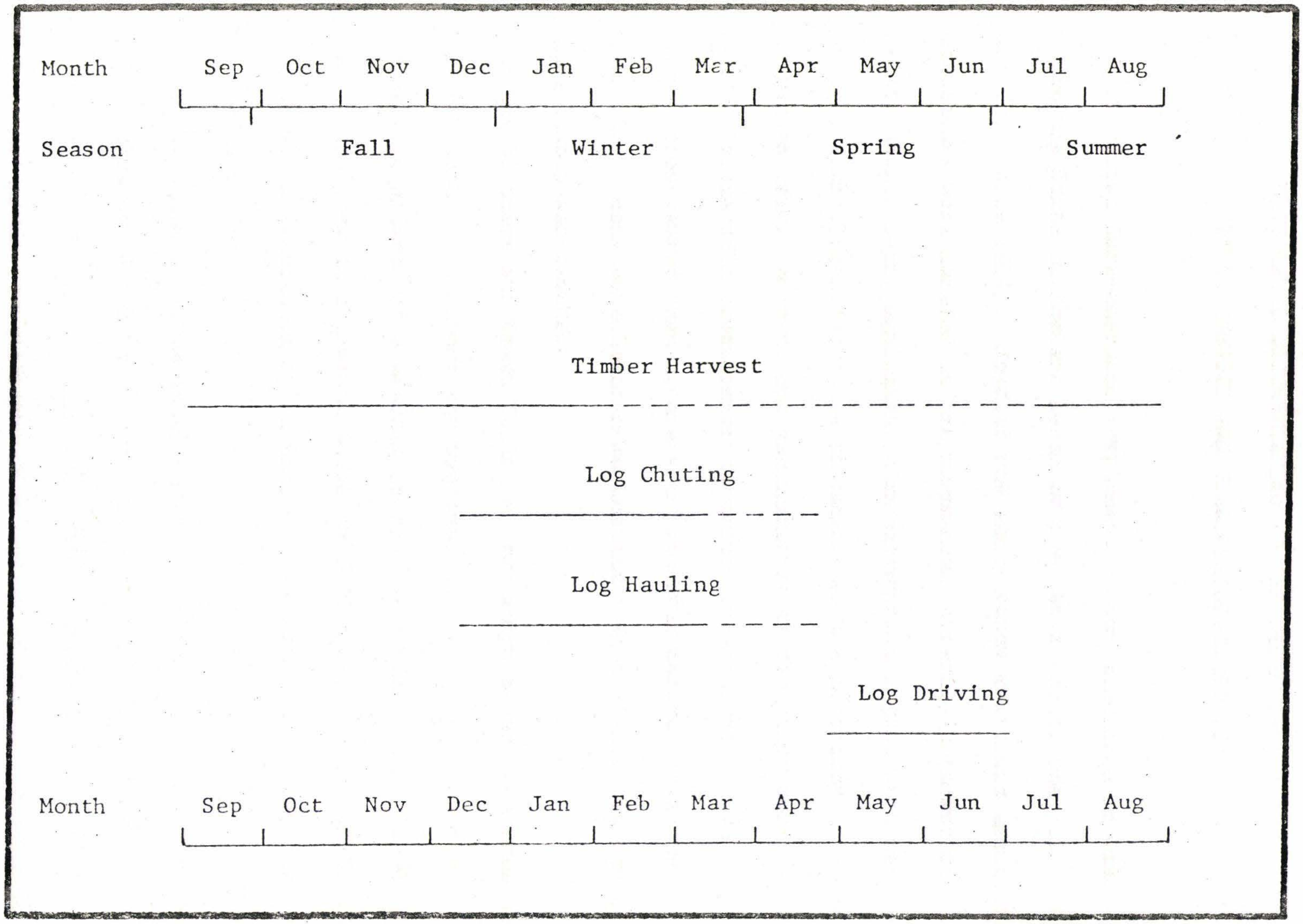
winter. During this time, trees would have been cut, limbed, and bucked, then moved to log decks to await their later conveyance to Sheep Creek.

Whereas timber harvest could be staged in nearly any season of the year, log chuting and hauling had to be accomplished in the winter. Timber harvest would thus have continued until it was late enough in the winter that snow accumulations favored log chuting and hauling, which would then have either pre-empted, or at least taken priority over, timber cutting. Although chuting and hauling were qualitatively different operations, they actually would have comprised a single "step" in the entire operation by virture of the fact that they both depended upon the presence of the same environmental condition, namely an accumulation of snow. During a period which would have included at least a part, perhaps all, of the three months between mid-December and mid-March (cf. p. 52, above), logs would have been moved via the Allen Gulch to the banks of Sheep Creek, there to lie in anticipation of the spring runoff.

The drive down Sheep Creek would have been scheduled to coincide with spring runoff, and would most likely have occurred during the 8-week period between April 29 and June 26. Again, environmental circumstances would have necessitated that log driving take priority over other tasks during these eight weeks.

After the drive was concluded, the annual task cycle would have resumed beginning with timber harvest. A representation of this proposed calendar is given in Figure 11.

Figure 11: The Proposed Calendar for Task Scheduling on Sheep Creek. The solid lines indicate the times of year at which it is proposed that the respective tasks took place. The dashed line under "Timber Harvest" indicates that this task could have, but probably did not occur during the late winter and spring. The dashed lines under "Log Chuting" and "Log Hauling" indicate that in some years, snow may have persisted late enough in the spring to allow these activities to be extended.


Month
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Season
Fall
Winter
Spring
Summer
Timber Harvest
Log Chuting
Log Hauling
Log Driving
Month
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug

## A Note about the Destination of Logs from Sheep Creek

Although not identified as one of the inferences that I wished to make about the Sheep Creek timber harvest and transportation system, the possible destination of the logs taken from Sheep Creek did occupy my curiosity. In fact, a proposed destination emerged in part from a consideration of the Sheep Creek splash dams in a broad ecological perspective.

For two reasons, it is surmised that logs from Sheep Creek were driven to the Smith River, down its length to the Missouri, then down that river to Great Falls, 11 miles below the mouth of the Smith (and a remarkable 116 miles from Deadman Dam). One reason for this belief is economic. If the drives were in fact conducted sometime around 1895, Great Falls was the only accessible market large enough to absorb the quantities of timber which must have descended Sheep Creek. The nearest settlement to Sheep Creek, White Sulphur Springs, was inhabited in 1890 by only 640 people (U. S. Department of the Interior 1892:259), and in 1900 by only 446 (U. S. Census Office 1901:251). Great Falls, on the other hand, was a burgeoning city of about 4,000 in 1890 (U. S. Department of the Interior 1892:258), and its numbers had grown to 15,000 by 1900 (U.S. Census Office 1901:249).

A second reason was suggested by characteristics of terrain on Sheep Creek downstream of site 24ME92 and on the Smith River.

Below Moose Dam, Sheep Creek enters a deep, narrow, 14-mile-long canyon, which extends to join an even more precipitous canyon on the Smith. Not far from the mouth of Sheep Creek, the Smith River enters a 40-mile canyon walled with sheer limestone cliffs (cf. Weed 1900:274). Certainly, no logs were leaving either canyon by any route other than water.

Once the Smith River leaves its canyon, it has already covered over half of the total distance to Great Falls, enroute to which it passes through farm and ranch land which even today remains sparsely settled. Great Falls thus emerges as the only economically and environmentally feasible destination for logs from Sheep Creek.

## Conclusion

The end of this chapter marks the close of the "archaeological" portion of the research process. To this point, I have presented a description of the Sheep Creek timber harvest and transportation system itself; a discussion of historically known logging devices and operations seen as being analogous to the ones evidenced on Sheep Creek; and a derivation of inferences about the use of the system, based on a combining of information from the above two stages.

In Chapter V, the attempt to historically document site 24ME92, and its results, are reported.

## CHAPTER V

## HISTORICAL DOCUMENTATION OF THE SHEEP CREEK TIMBER HARVEST AND TRANSPORTATION SYSTEM

The first Euro-american settlement of any magnitude in what is now the State of Montana began in the 1860s during the gold rush era (Toole 1959). Most of the early mines and their associated settlements were located in the mountains, directly adjacent to the ore bodies being exploited, thus enjoying the good fortune of having a timber resource close at hand. As the territory's population grew, however, and particularly as the railroads reached Montana, mercantile towns began to spring up adjacent to transportation routes rather than to areas of specific natural resource occurrence. Many were located on Montana's High Plains, in areas where timber was remote.

One of these was Great Falls, a town which began to emerge in the late 1880s as an important regional marketing center, primarily through the efforts of a wealthy entrepreneur named Paris Gibson. Great Falls grew to a town of 4,000 by 1890 and to a city of 15,000 by 1900 (U. S. Census Office 1901; U. S. Department of the Interior 1892; Walters 1977).

Great Falls is situated around the confluences of the Sun River and the Missouri River, and just upstream of the five Great Falls of the Missouri. One might think, at first glance, that the city's locale was ideal. It surrounds the conflux of two of the state's

great rivers; it abuts the Great Falls, which eventually helped to supply hydroelectric power to the city; and, thanks to Paris Gibson, it is an important railhead (Walters 1977). But because Great Falls lies at the brink of the vast, treeless High Plains country, a raw commodity essential to the city's growth--timber--was lacking in its immediate vicinity. Significant stands did exist to the south in the Big Belt and Little Belt Mountains, and to the west in the Rocky Mountain Front, but these are 25 to 125 miles distant. Clearly, a means of moving timber from the mountains to the city was necessary. Fortunately for the growing city of Great Falls, there was the Missouri River.

Although the Falls themselves posed a massive barricade to river transportation below the city (Thwaites 1905; Vestal 1945:317), Great Falls is situated at the downstream end of the "Long Pool", a navigable stretch of the Missouri which provided a link with the mountains to the south (Figure 12). Precisely for that reason, the A. M. Holter lumber company had located a sawmill near the future townsite in 1881 (Walters 1977). During the period of 1881 to 1883, Holter began to harvest timber from the untouched stands in the Big Belt Mountains, and to transport logs free of charge to his mill. By staying on the mountainsides and gulches adjacent to the river, his loggers had merely to skid their logs into the Missouri, tie them into rafts, and float them to the mill, where they were caught and plucked from the river, then sawed and shipped overland by wagon (Walters 1977).

Using this method, the Holter company and its competitors, the Boston and Montana Company and the firm of Myers and Maclay, started at Stickney Creek (Figure 12) and rapidly progressed upriver until the easily transportable timber had been depleted. Then, instead of moving inland to the interior of the Big Belts and risking increased transportation costs, the lumbermen began to look to the larger tributaries of the Missouri for similar opportunities to harvest and cheaply move logs to Great Falls. Thus the Sun River, the Dearborn River, and finally the Smith River (which joins the Long Pool eleven miles above Great Falls) were, in their turn, attacked (Waiters 1977).

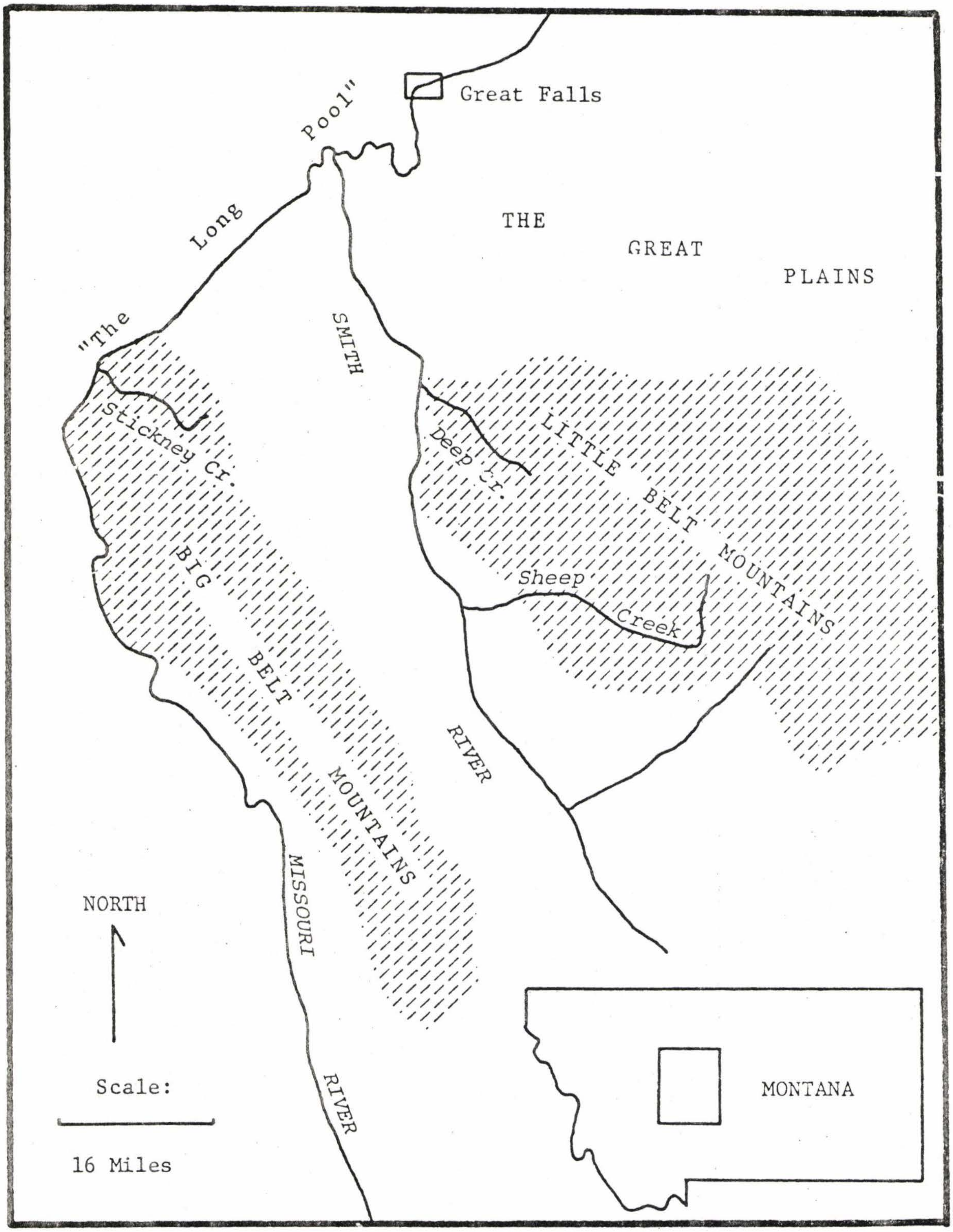
Ira Myers, one of the partners of the aforementioned corporation of Myers and Maclay, was apparently the first to move into the Smith River country, making his first drive down the Smith in the spring of 1884 (Fort Benton River Press 1884). Myers' success on the Smith attracted the Holters, and the two competitors began to move up the Smith River in much the same fashion as they previously had on the Missouri River. In 1887, Myers effected a drive which, for the time, was considered large when he floated 1 million board-feet (Glossary) of timber to Great Falls from the mouth of Deep Creek (Figure 12; Great Falls Tribune 1887).

By 1889, lumbermen were beginning to notice the timber stands on Sheep Creek. In March of that year, Charles Wegner, a foreman for the Holter lumber company, visited Sheep Creek and reported that the

outlook for timber production there was favorable (Great Falls Tribune 1889a). Here, however, a serious transportation problem finally arose. Sheep Creek ran entirely too little water to accommodate a log drive of any sort. Faced literally with no other place to go (Figure 12), Holter and the others decided that the timber available in Sheep Creek was worth the expense that would be necessary to transport it to the Smith River, and they engaged the Butte and Montana Commercial Company, a wealthy syndicate with an active lumber division, to construct a 20-mile flume (Glossary) from the upper reaches of Sheep Creek to the Smith (Great Falls Tribune 1889b).

Under the recommendation of its superintendent, George Sewell, the Butte and Montana soon discarded the idea of a flume and decided instead to move timber down Sheep Creek using a series of splash dams (Meagher County News 1890). Apparently, construction of the dams was begun late in 1889 and completed in time to allow them to be used in the spring drive of 1890. During the first week in May 1890, Wegner visited Sheep Creek and, upon his return to Great Falls, made the report that the Smith River was "rising and this is a favorable time for the drive" (Great Falls Tribune 1890a). The log drive of 1890 was forecast to bring from Sheep Creek to Great Falls via the Smith River a respectable 3.5 million board-feet (Great Falls Tribune 1890b).

Figure 12: Timber Resources South of Great Falls. The shaded areas represent mountain ranges with significant timber resources. The areas where timber stands front on the Missouri River and on the Smith River were exploited early by the Holters, the Boston and Montana Company, and Myers and Maclay. Note the locations of the Long Pool, Stickney Creek, and Deep Creek.


Great Falls
"The Long Pool"
THE GREAT PLAINS
SMITH RIVER
Stickney Cr.
Deep Cr.
LITTLE BELT MOUNTAINS
Sheep Creek
BIG BELT MOUNTAINS
MISSOURI RIVER
NORTH
Scale:
16 Miles
MONTANA

Holter's loggers worked cutting timber through the summer and fall of 1890 and probably into the winter of 1890-1891. The company's financial statement for January 1, 1891 lists as part of its assets a total of $3600.00 worth of logs on the ground at Sheep Creek (A. M. Holter and Brother, Inc. 1891). Sometime during the winter, the loggers must have begun moving logs from the mountains into the Sheep Creek valley, for when George Sewell paid a visit to White Sulphur Springs during the third week of February, 1891, he reported that all logs were "sawed and branded" (Glossary), indicating that timber harvest had come to a close (Meagher County News 1891a).

Again in 1891, the drive from Sheep Creek began sometime in early May. On May 11 and 12, 1891, the reporter of the Meagher County News viewed the dams and the drive, which by that time had already passed Moose Dam, and has provided an eyewitness account of the operation:

> The largest dam [Allen Dam] is 800 feet long and about a half mile above the headquarters camp on Sheep Creek. The structure is 48 feet [wide] at the bottom and about 24 feet high and has in its construction over 100,000 feet of logs. The water can be raised to a depth of about 22 feet and backs up in the gulch for nearly a half mile, making a lake of no small proportion. The dam below is about 350 feet long [referring to Moose Dam] and about the same height, and when properly repaired will hold about the same depth of water.
>
> On the morning of the 12th, we visited the jam in the canyon [below Moose Dam] and witnessed a sight which we shall long remember. The logs were piled fifteen to thirty-five feet high upon one another, and we waited expectantly for the flood from the two dams above to come and move the immense mass. When the water arrived the men commenced to pick out

> the logs which formed the key and with about fifteen minutes work the vast mass gave way, fell seething into the water and went curling down the stream like a mammoth sea serpent wriggling on the water (Meagher County News 1891b).

The article further reports that in this way the drive was moved incrementally toward the Smith River, the dams supplying water in adequate volume to allow logs to be floated for several hours each day, and enabling the drive to cover a distance of two to three miles per day. Notice that the reporter observed only two dams, not three, and that the dimensions quoted, especially the lengths, were somewhat inaccurate (*cf.* pp. 13-15, above).

By this incremental, one-surge-at-a-time method, the 1891 drive was moved into the Smith River, where the entire volume of the drive, a total of 4 million board-feet (Great Falls Tribune 1891) was finally amassed for the remaining 91-mile journey to Great Falls. By June 26, the drive had passed out of Sheep Creek and was on its way down the Smith (Meagher County News 1891c).

Through the summer of 1891, fallers worked in the timber on Sheep Creek, and Sewell and his crew worked preparing the dams for the next year's run (Meagher County News 1891c, 1891d). Crews were still at work in December of 1891, at which time Sewell visited White Sulphur Springs with the report that on Sheep Creek, "everything [was] running smoothly" (Meagher County News 1891e).

If a drive was made in the spring of 1892 (as had been anticipated), it did not receive the same publicity as had the drives of the previous two years, for no report of one was found

in either the Great Falls Tribune or the Meagher County News. After George Sewell made another of his periodic visits to White Sulphur Springs in June of 1892 (Meagher County News 1892), news of any activity on Sheep Creek ceases to be reported in either newspaper. No further documentation of the dealings of Sewell, of the Butte and Montana Commercial Company, or of anyone logging on Sheep Creek could be found for the balance of 1892.

In three versions of Anton Holter's (the owner of the Holter lumber company mentioned in several places above) memoirs which I have seen (Holter 1911, 1917, 1928), not one makes any mention of the Sheep Creek splash dams. The drives from Sheep Creek are discussed in a very general way, but Holter himself was apparently either uninformed of, unconcerned with, or unimpressed with the elaborate means by which his logs accomplished their journeys to Great Falls.

For whatever reasons, but certainly not for the want of timber, the Sheep Creek logging and log driving operations ceased after 1892. Visiting the Little Belts in 1893 and 1894 for the purpose of geological mapping, Walter Weed (1900:306, 308) saw both Moose Dam and Deadman Dam and, oddly enough, characterized them as "old" dams which had been "erected when timbermen were at work" in the Sheep Creek valley.

## CHAPTER VI

## THE COMPARISON OF AN ARCHAEOLOGICAL AND AN HISTORICAL KNOWLEDGE OF THE SHEEP CREEK TIMBER HARVEST AND TRANSPORTATION SYSTEM

In this paper, I have described and interpreted the material remains of an integrated set of technological activities, remains for which I initially knew of no written records. Although it might correctly be said that the cultural system responsible for depositing the remains present on Sheep Creek is my own, I do not think that I was thereby equipped in any special way for making the interpretations set forth above (Chapter II). Splash dams, log chutes, and log hauling roads are manifestations of a technology with which I was little more intimately acquainted than I am with the technological systems that have left bison jumps, tipi rings, and flaked stone tools.

If there was an advantage inherent in working with the material byproducts of 1890s logging technology rather than with the prehistoric technology of bison procurement, it was that former participants in 1890s-style logging left written records of their experiences. In the same way that I might employ the knowledge of a member of a modern stone tool-using culture (ethnoarchaeology), or the experiences of a past observer of an extinct stone tool-using culture (ethnohistory) to attain some familiarity with the technology of prehistoric bison hunters, I internalized

and explicitly utilized some of the knowledge left by loggers and river pigs in order to make informed judgements about the material remains of the behavioral system in which they formerly participated (p. 38, above).

Then, I reconsidered, in the light of its behavioral context, the cultural material that I had observed, and inferred a set of propositions regarding the way in which timber harvest and transportation activities on Sheep Creek were scheduled and sequenced (Chapter IV). Finally, I obtained written records pertaining to logging activities on Sheep Creek (Chapter V). It should now be possible to take the step not available to the archaeologist working in a prehistoric setting, and test the archaeological inferences by considering them in comparison to knowledge gained from the historical record for Sheep Creek.

## Timber Harvest

By combining artifactual data (tree stump heights), knowledge of specific human behavior (historical analogs) and environmental information (records of snow accumulations), it was inferred that on Sheep Creek, timber harvest took place during both the warm months of the year and the winter. This inference meets with some support and approval from the historical record, which is less than explicit on the matter. It is certain that loggers were at work

in the summer (Meagher County News 1891b) and through late August (Meagher County News 1891d). It is strongly indicated that work progressed into December (Meagher County News 1891e) and probably into late winter. When George Sewell visited White Sulphur Springs in February of 1891 (Meagher County News 1891a), he reported that all logs were "sawed" (bucked), a procedure which generally followed directly the falling of trees (Kephart 1976; Rector 1953; pp. 32, 48 above).

## Chuting and Hauling

It has also been reasoned that the conveyance of logs from cutting units to Sheep Creek was staged in winter. Again in this instance, a conclusion was made based on artifactual data, some knowledge of human behavior, and environmental data. It was inferred that because there was no occurrence of certain expectable artifacts, namely a corduroy road and apparatus associated with the use of grease as a chute lubricant, the logs were transferred during a season (winter) when the process would have been facilitated naturally (i.e., with the use of snow).

Of all the inferences made about the Sheep Creek logging system, this one meets with the least direct endorsement from the historical data. Sewell's report of February, 1891 (Meagher County News 1891a)

states that, by that time, the sawing and branding of logs had recently been completed. This fact has little bearing upon the possible timing of the use of log chutes and the hauling road unless other historical knowledge is called into play. In historical logging contexts beyond Sheep Creek, Roberge (1973) notes that logs are branded in the woods before being conveyed elsewhere, but Rector (1953:110-111) implies that logs were branded as a final step after being hauled to landings adjacent to the stream upon which a log drive was to be staged. Even given the disagreement between these two sources, it could still be presumed that chuting and hauling on Sheep Creek either began after logs were branded in mid-February (with plenty of winter left; see p. 53, above), or occupied a portion of winter before logs were finally branded in mid-February.

## The Drive....

Based upon knowledge of log drives apparently analogous to the ones conducted on Sheep Creek, and upon environmental data, an estimate was made of the precise time period during which a log drive could best be accomplished on Sheep Creek. It was inferred that the drive(s) which employed the splash dams at 24ME92 would have occurred between April 29 and June 26 of the year(s) in which they were conducted. Though exact dates for

the beginning or the end of either the 1890 or 1891 drives are not obtainable from the historical documents found (the Meagher County News was, and is still, a weekly), the statement made by Charles Wegner on May 6, 1890 (Great Falls Tribune 1890a) implies that the 1890 drive had not yet begun by that date. In 1891, reports in the Meagher County News (1891b, 1891c) indicate that the drive began sometime prior to May 12, and passed from Sheep Creek during the week prior to June 26.

....and Its Destination

A final inference concerned the final destination of logs leaving Sheep Creek. Because the city of Great Falls appeared to be the nearest feasible market, and because over half of the distance between 24ME92 and Great Falls is typified by terrain which would have precluded transportation of logs away from the water, it was concluded that Great Falls was in fact the objective sought. The historical references show that logs were floated to Great Falls from Sheep Creek, primarily to a mill operated by A. M. Holter, and that they helped to supply timber for one of Great Falls' hydroelectric dams (Great Falls Tribune 1890a).

## Conclusions

Archaeologists under all circumstances strive to explain their observations of the archaeological record; yet, in relatively few cases do they have the opportunity to provide direct historical verifications (or refutations) of their explanations. It is quite satisfying, in this respect, to report that archaeologically-derived inferences pertaining to logging activities at site 24ME92 compare so favorably to the historical record. Given that the less-than-200 years of Montana history are so vastly outnumbered by the greater-than-10,000 years of Montana prehistory, however, it is perhaps not the historical affirmation of archaeological inferences, as much as it is the method of their derivation, which is of general importance to Montana archaeologists.

As has been noted in several contexts in this paper, research was a five-stage process, of which the first three were considered "archaeological" research stages. First, and most importantly, I isolated on Sheep Creek a system which included the remains of the resource procurement activities of a group for all seasons of the year. From observations (made through the historical literature) of situations which appeared to be analogous to that on Sheep Creek, I synthesized a set of relationships between behavior and material technology, then used these to test hypotheses about the sequencing

and scheduling of tasks in the entire logging operation (i.e., the entire procurement system). This sort of approach, in which an entire year's activities are considered as a whole, seems well suited to the study of the prehistoric lifestyle in Montana, where (as is generally agreed) people moved in a seasonal round of procurement activities. In fact, the type of research program suggested has been used quite successfully in other areas of the New World. What I offer to Montana archaeologists, then, is a local example which I hope is instructive.

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# GLOSSARY*

Board-foot: the unit in which volumes of logs are measured. A board-foot is a volume equivalent to a piece of wood one foot square and one inch thick.

Branding: the placement of a unique identifying mark on the ends or in the bark of the logs owned by a particular logging firm. The branding of logs was common, and actually was necessary in situations where logs belonging to more than one firm were to be combined in a single log drive.

Bucking: the process of sawing a downed tree into sections of the length desired for transportation. Bucking transformed a _tree_ into _logs_.

Fallers: the men who cut down trees. In some regions of the United States, also called "choppers" or "sawyers". They were _never_ called "fellers".

Falling: the process of cutting down trees. _Never_ called "felling"; however, the past tense is "felled", seldom "falled".

Flume: a mode of conveying felled, limbed, and bucked trees (i.e., logs) which involved the use of a long trough filled with running water.

Forest: the physical location in which trees grow. The term does not refer to the trees themselves, but to land with the attribute of having trees growing on it.

Hauling road: a route over which large quantities of logs were conveyed. A number of designs were used, ranging from an unimproved path to a roadway made of logs (corduroy road) or planks (plank road). Sometimes called a "skid road".

Landing: a tier of pile of logs assembled adjacent to a stream upon which a log drive was to take place. Landings are similar to log decks, but involved much greater numbers of logs. In the Lakes States, also known as "rollways", because the logs were rolled into the stream when the drive began.

Limbing: the process of removing limbs from a tree after it has been felled.

Log: the end-product of falling, limbing, and bucking a tree. Logs were the things transported away from timber cutting units (not trees, timber, wood, or lumber).

Log chute: any of a number of designs which provided a track or trough or even a ditch in which logs were conveyed by sliding them with the help either of gravity or draft animals.

Log deck: a temporary pile of logs awaiting transfer to another location via log chutes or hauling roads. On rare occasions, synonymous with "landing", but usually containing far fewer logs than would a landing.

Log drive: a technique of log transportation, in which logs were floated down a river or stream. The last of these in the United States was made in 1971, on the Clearwater River, Idaho.

Logger: a person who works (in any of several capacities) on a logging operation. Although the term is equivalent to "lumberjack", in the northwestern United States one is a logger, <u>never</u> a lumberjack.

Logging: the total operation of cutting timber and moving logs to mills.

Lumber: the product which results when logs are milled (sawed at a sawmill). Houses are made from pieces of lumber (e.g., two by fours, one by twos, etc.).

River pig: the somewhat unflattering term applied to the men who rode downriver with a log drive, who guided it on its way, who broke log jams, and who evidently took no exception to the term. As of 1971, there are only "former river pigs" in the United States.

Skid trail: a route, usually improved only by the removal of trees from its path, over which light-duty log hauling was done. Logs were yarded via skid trails.

Skidding: the process of pulling logs over skid trails, using draft animals harnessed to single logs or strings of logs or to sledges carrying logs.

Sled: see sleigh.

Sledge: a robust kind of "sled" which was used mainly on skid trails, and <u>always</u> on dry ground (as opposed to snow or ice--see sleigh).

Sleigh: these were used to haul heavy loads of logs over snow or ice. They sometimes were called sleds, and in a few cases were known as "bobsleds".

Splash dam: these were erected on streams normally too small to accomodate a log drive, and were used to create a flood that enabled logs to be driven. Sometimes the flood was released by the dynamiting of the splash dam; in other cases, the dam was equipped with a sluice through which water and logs could be allowed to pass.

Stand: see timber stand.

Timber: a very inclusive term used sometimes to refer to the physical location in which trees grow, in which cases it was synoymous with "forest". More often, a group of (living) trees, referred to specifically as, for example, "that timber". Sometimes, a specific piece of heavy lumber or a specific log in a structure (bridges, dams, ships, and underground mines all had "timbers").

Timber stand: a term which referred simultaneously to a group of trees <u>and</u> their location, thus being more specific than either "forest" or "timber". Also, a group of trees having an attribute in common, such as a group of trees of the same species.

Tree: a single organism (either living or dead) of a sort with which we are all familiar.

Trees: very strictly the plural of "tree"; on rare occasions, used synonymously with "forest" or with the locational sense of "timber", such as "in the trees".

Wood: a substance with which craftsmen sometimes work. Houses are made of lumber; gun-stocks, roll-top desks, fine furniture, and some sculptures are made of "wood". In the northwestern U. S., there would be no such thing as Winnie the Pooh's three-acre wood.

Woods: approximately the same as "forest" or as "timber" in its locational sense, but more general than either. Bears do various things in the woods (that is, the forest); on weekends, especially in summer, many people leave the city and head for "the woods" (in this sense, the term is broader than either "forest" or "timber").

Yarding: the process of moving logs to the locations in which they will be piled into log decks. Although yarding was done via skid trails, the term "yarding" is a more definite term than is "skidding", because the destination is specified.

Yards: the locations of groups of log decks.

*This glossary represents the author's condensation of the meanings of the terms listed, meanings which were learned in the process of reading several accounts of historical logging activities (Brown 1936; Cox 1974; Dyche 1964; Fries 1951; Holter 1911, 1917, 1928; Hutchinson 1973; Kephart 1976; Lynn 1976; MacKenzie and Maunder 1972; Margolin 1911; Ransom 1969; Rector 1953; Roberge 1973; Rutledge and Tooker 1970; Schon 1971). A short glossary included in the article by Rutledge and Tooker (1970) was helpful but has not been copied herein. Where there were several terms for the same thing or activity, the ones accepted in the northwestern U. S. (that is, the ones applicable to central Montana) were used. The definitions for forest, timber, timber stand, wood, and woods are written to conform with the usage of these terms by Montanans.